The Monthly Review of the AMERICAN ELECTROPLATERS' SOCIETY

CONTENTS

New Assistant Director of Bureau of Engraving and Printing 773

Bjorklund—The Determination and Control of pH 775

A Message from the Research Committee 784

Glasstone—Fundamentals of Electrochemistry and Electrodeposition, III, Ions in Solutions of Electrolytes 785

Starr—Supplies and Defense 788

Simonson—Quality vs. Physical Tests of Hide 789

Diggin—Nickel Plating Without Nickel Chloride 792

Branch News 795

1942 Convention News 826

Here and There 829

Membership Report 842

Membership Campaign Report 843

Index to Advertisers 844

Buyers' Guide 845

Branch Directory 852

OCTOBER 1941

TEAMWORK

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NEW ASSISTANT DIRECTOR OF BUREAU OF ENGRAVING AND PRINTING

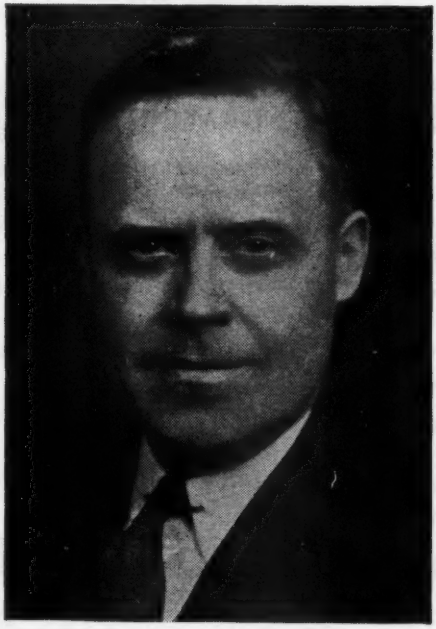
Thomas F. Slattery, former superintendent of the Electrolytic plate making section of the Bureau of Engraving and Printing, has been appointed by Secretary Morgenthau to be Assistant Director of the Bureau, the treasury announced on September 22. He succeeds Jesse E. Swigart who is on leave pending retirement.

Mr. Slattery was born in Norwich, Conn., and early in life associated himself with his late father, John W. Slattery, who was a charter member of the A.E.S. In 1910 he accepted a position as supervisor of the finishing departments of the Cornwall and Patterson Manufacturing Company, Bridgeport, Conn., where he remained until 1918. At this time he was inducted into the U.S. Army, assigned to the Chemical Warfare Service, and detailed to the National Bureau of Standards, Washington, D. C., to assist in electroplating research. After the Armistice he went to the P. & F. Corbin Branch, American Hardware Corporation, New Britain, Conn., as superintendent of their large finishing and plating departments. In 1920 he returned to Washington to accept the position of superintendent of the new Electrolyte Process for the production of intaglio printing plates which are used at the Bureau of Engraving and Printing for the printing of United States currency, Bonds, Stamps, and Revenue. This process is known to have saved the government thousands of dollars and produces the finest intaglio printing plates in the world, both efficiently and economically. Mr. Slattery continued in charge of this plant until his promotion to be the Assistant Director of Production on September 8, 1941.

He is a charter member of the Bridgeport and Baltimore-

Washington branches, A.E.S., and a long-time member of the Supreme Society. He is a Past President and now serves as a member of the Research Committee of our Society.

The number of employees now on the Bureau's payroll is 6,502, working five days a week with the most modern machinery in an especially planned factory building with approximately 10 acres of floor space. The output of the Bureau ranges from



THOMAS F. SLATTERY

one-half cent postage stamps to $1,000,00 Treasury bills. It includes not merely all processes in the production of currency, from the mixing of ink and the preparation of the original design, but also the production of all bonds, notes and other securities of the United States, all revenue and postage stamps and a multiplicity of checks and other forms and papers used in financial and business transactions of the Government.

All members of the A.E.S. unite in sending their best wishes to Mr. Slattery as he assumes his new and important duties. Mr. Slattery will continue to keep up his interest in the A. E. S. as much as his time will allow.

The Determination *and* Control *of* pH

Read at the August, 1941, meeting
Montreal Branch

By G. H. BJORKLUND
Fisher Scientific Company Ltd.,
Montreal, Quebec.

THE term pH is familiar to everyone as referring to the $[H^+]$ of a solution. There has been a tendency, however, to think that it also refers to the amount or quantity of acid, or alkali, that may be present. Such is not the case. The quantity of acid or alkali present is determined by titration with a standard solution, and when the process is finished, there is left a solution, the pH of which is quite different from that of the original. The $[H^+]$ or pH, is a measure of the degree of acidity or alkalinity.

There is an analogy in heat measurements. A determination may be made involving materials possessing potential heat, in calories or B.T.U. The actual temperature of the process as measured with a thermometer indicates the degree of heat involved. In many cases, it is not the calorific value of the reactant which is the controlling factor, but rather the operating temperature; in chemical processes, the degree of acidity, or pH, is generally the controlling factor, not the quantity of acid or alkali.

Most acids, bases and salts belong to that class of compounds known as electrolytes. On being dissolved in water, these compounds undergo what we term 'dissociation' or 'ionization' and it is the ions thus produced which permit the passage of the electric current — whence the name electrolyte. Some dissociate to a large degree and are strong electrolytes, others ionize only to a slight extent and consequently are weak electrolytes.

For instance, a N solution HCl has a pH = 0.1
a 0.1N " " " " " = 1.1
a N " H_2SO_4 " " " = 0.3
a 0.1N " " " " " = 1.2

These are the strong mineral acids, and as can be seen, yield a high concentration of H^+ which in turn leads to a low pH value. Other acids, and bases, are weakly ionized, such as

HCN —	O.IN	has a pH	= 5.1
H_2S —	O.IN	" " "	= 4.1
H_3BO_4	O.IN	" " "	= 5.2
$NaHCO_3$	O.IN	" " "	= 8.4

Pure water is a very feeble conductor, but it does conduct a current, however small. Many investigators have worked on this, notably Kohlrausch, who carried out in the neighborhood of 45 to 50 distillations. This water, known as conductivity water, was lead into containers which had been thoroughly cleaned. After years of this sort of thing, he was ready to take a few measurements, which required less than an hour. (Preparation, it would appear, is rather important.) Many experiments lead to the result that $[H^+]\,[OH^-] = 10^{-14}$. The concentrations here are expressed in gram-moles per litre. Referring to the concentrations of H^+ or OH^- in such a manner is awkward and, in 1909, Sorensen proposed the pH scale which since has become universally accepted. pH is defined, therefore, as $\log \frac{1}{[H^+]}$. We can illustrate the conversion with a couple of examples.

Let us take water, $[H^+] = 10^{-7}$

$$\text{Now pH} = \log \frac{1}{[H^+]}$$
$$= \log \frac{1}{10^{-7}}$$
$$= \log 1 - \log 10^{-7}$$
$$= 0 + 7$$
$$= 7 \text{ — neutrality.}$$

Suppose a solution having a $[H^+] = 2 \times 10^{-3}$

$$\text{Again pH} = \log \frac{1}{2 \times 10^{-3}}$$
$$= \log 1 - \log (2 \times 10^{-3})$$
$$= \log 1 - \log 2 - \log 10^{-3}$$
$$= 0 - 0.3010 + 3$$
$$= 2.6990 \text{ or } -2.7$$

So much for the calculation of pH. The pH, then, can be determined, once the percentage ionization of an electrolyte and its concentration in a solution are known. By application of the Law of Mass Action, the actual $[H^+]$ may be calculated and

thence the pH. But this method is anything but convenient; certainly it would not do in the plant. We have indicators, which are organic dyes of rather complex structure, and which give a characteristic color change with change in pH. The selection of indicators has been extended to such a degree that they are now available so as to give a definite color change over a narrow range of pH. This is the basis of the colorimetric method of pH control.

This method has been well developed and has enjoyed a wide popularity. A method which is a relative newcomer in this field, and which is becoming increasingly widespread, is the electrometric method. Practically every chemical industry has found it necessary to control pH in order to assure reproducible conditions and a constant, uniform product. To this end, the colorimetric method has been used, and more recently the electrometric.

In the former case, indicators are employed, either as a solution, or in the form of paper strips, which is simply filter paper impregnated with indicator. In a test, a few drops of indicator are added to the solution, and comparison is made with a previously prepared standard which contains indicator in a buffer solution of a known value. In many cases, the test solution is colored, and this modifies the shade produced. Various arrangements are available, however, to get around this, and fairly accurate determinations are possible. The method is entirely a visual one and thus depends upon the operator's ability to detect slight changes in color, to differentiate between them and to match them with standards, modified or unmodified. The light source, moreover, cannot be disregarded and daylight is invariably recommended, a northern exposure which is more constant than any other source, being best. Artificial light which contains a high percentage of the yellow is useless in making accurate comparisons. This visual method is subject to eye fatigue, however, especially where a series of determinations are being made, and this also introduces appreciable error.

The electrometric offered many advantages not possible with the colorimetric. Electrodes are placed in a small sample, which may or may not be colored, clear or opaque, a button pushed and a reading made. Of course, bringing this method

to such a simple procedure required many years of intensive research. Early arrangements were quite complicated, involving potentiometers, batteries, stirrers, cumbersome electrodes and, of course, a maze of wires.

There is required what is known as a reference electrode, which sets up a constant potential within itself. There are several such electrodes. First, there is the standard hydrogen electrode, which consists of a small cylinder of platinum immersed in a standard acid solution. Pure hydrogen, passed in under a constant pressure, forms a layer of gas around the cylinder. This then acts, to all intents and purposes, as though it were a metal. The arrangement is complicated, but gives a very constant and reproducible e.m.f., and has been selected, by international agreement, as the standard electrode. Its potential has been arbitrarily set at zero, and all other standard electrodes are calculated as to potential from the hydrogen electrode.

There are other standards, the most common of which are the O.IN, N, and saturated calomel electrodes. Of these, the most widely employed is the last mentioned, since all that is required is the addition of saturated potassium chloride once the mercury-calomel-potassium chloride paste has been prepared.

So far, we have only concerned ourselves with the standard or reference electrode. To make a measurement, a second electrode is required, one, the potential of which varies with the $[H^+]$ of the solution. The potential difference of the pair is measured via the potentiometer, the reading being taken in millivolts. This is then translated in terms of pH. For this purpose, a platinum, tungsten, quinhydrone, and more recently the glass electrode, is employed.

The platinum electrode is not always as sensitive as it might be; the tungsten electrode has found application in many instances but requires re-sensitization at intervals. The quinhydrone electrode has long been used and consists essentially of a gold electrode immersed in the solution, to which a small amount of quinhydrone has been added. It is accurate and simple to use, but is decidedly limited in its application. Quinhydrone is a monomolecular mixture of hydroquinone and quinone, and an equilibrium is set up, depending upon the $[H^+]$ of the solution, and consequently the pH. This electrode is limited in

that it cannot be used in the presence of oxidizing or reducing substances. Nor can it be employed in solutions above a pH of 8 — 8.5. Oxidation of the quinhydrone begins and destroys its variable equilibrium.

We are left, therefore, with the glass electrode as being the most universal, and even it is not entirely faultless. An enormous amount of work has been done using the glass electrode. It really is a great advance over the others: it can be employed in the presence of oxidizing and reducing substances; it does not contaminate the test solution; it shows up small differences in potential. The first types of glass electrode were decidedly fragile. Figuratively speaking if one looked at it, it broke; certainly if a stream of wash water were directed upon it, it cracked. Obviously such was not intended for commercial use, but only for laboratory and research work. Efforts were continued and the Corning Glass Company prepared a borosilicate glass, designated as 015 glass, which could be worked so as to give a remarkably rugged, yet at the same time sensitive, glass electrode. The bulb is thin, and still requires careful handling. It is, however, a great advance over the original.

Up to this point, there has been nothing but praise for the glass electrode. But it is not without fault. The ordinary glass electrode can be used in any type of solution up to a pH of 8 — 9. Then error in pH value begins to creep in. The 015 glass is soft, and a certain amount of solution occurs in the presence of alkali. This error, known as the Na^+, or K^+ error, increases with increase in pH. Fortunately the amount of this error bears a definite relationship to the $[Na^+]$ of a solution and thus a correction can be applied and the true pH obtained, if the $[Na^+]$ is known. While this research was proceeding, work was also being carried out to make the entire method simple to use and to make it available for test anywhere.

The pH meter presently available is a compact instrument, and portable; it weighs only 25 pounds. More and more is industry turning to the electrometric method of controlling pH. The instrument requires little attention and its operational costs are at a minimum. The electrodes are compact, about the size of a fountain pen. The glass electrode requires no attention, the calomel electrode requires only the occasional addition of

saturated potassium chloride solution. The meter itself is a sensitive galvanometer and shows up small e.m.f. changes. Being calibrated directly in terms of pH, no translation is necessary. All that is required to make a test is to take a small sample, place the beaker containing it under the electrodes, press a button and note the reading. By means of this electrometric method, colored and turbid solutions, clear and colorless solutions, all can be determined with equal ease, where colorimetry is difficult, if not impossible. Moreover, the personal element present in the colorimetric method is entirely removed when the pH meter is employed.

It was previously stated that the glass electrode introduces an error in alkaline solutions. The Corning Glass Company again came through, so to speak, and developed a glass that can be used in the presence of alkali. There is now available a high pH glass electrode which can be employed in media up to a value of 12. Above this, error requiring correction is again introduced, but is small and is very readily applied.

Let us now consider a few examples, where pH control has made for better and more consistent plating. It was early discovered that to plate nickel in a satisfactory manner, the pH required close control. The very earliest attempt at regulation of acidity was made by tasting the solution. Later on litmus paper was used, the assumption being that the bath was correct when the litmus turned from blue to a reddish-violet. Admittedly such procedures were very inexact. Experience has demonstrated the fact that improper acidity of the nickel-plating bath leads to pitting, cracking, curling, too hard or too soft a deposit, burnt deposits, discoloration, and so forth. It has been also shown that even slight variations in acidity cause marked effects upon the appearance and properties of the deposit. Nickel solutions are usually maintained between 5.2 — 6.8. Under normal conditions, in still tanks, a value of 5.6 — 5.8 has been found to give the best results. Higher pH leads to soft and dull deposits, lower pH leads to harder and brighter, but more brittle deposits. It is very difficult to state a specific pH at which to operate, since it depends upon several factors, such as composition of electrolyte, operating conditions, which introduce another series of factors, and the finish desired. Preliminary tests would

yield data which then would be available to all and would assure the best results under any one or more of several possible conditions.

A nickel bath has been recently developed that operates at a low pH — 1.5 — 2.5. Here the work is carried out at high temperatures and produces thick deposits. Concentrated nickel solutions are used. Although the deposit is coarse grained, as the temperature rises, this is corrected by increasing the current density. Satisfactory deposits have been obtained from a solution containing 75 g/ litre nickel, at 70 — 80°C, operating at a current density of 4.8 amps./dm^2.

In the plating of zinc, two general methods are available; namely, the acid zinc and cyanide zinc processes. The former is widely used for the plating of pipe, wire cloth and wire, where a smooth, white, rust-resisting but not necessarily bright deposit is desired. Acid zinc is not available for the plating of irregularly shaped articles since the throwing power is very poor. The solution is maintained at 3.4 — 4.4. Other authorities say the effective range is 3.5 — 4.6.

Conditions vary from plant to plant and it is advisable to conduct preliminary experiments to determine the pH best suited for the class of work being done. $ZnSO_4$ is the electrolyte employed and other salts are added, as a rule, to enhance the conductivity of the solution. $Al_2(SO_4)_3$ is added for this purpose, but it also has a specific effect upon the character of the deposit. The salt tends to produce smaller crystals and permits the use of higher current densities without developing irregularities. This last factor, higher current density, requires a lower pH, say a value in the lower range of that specified. During the process there is a tendency for the pH to rise and around 4.5 — 4.6, aluminum will separate as the hydroxide in the form of a white, gelatinous precipitate. Addition of acid until this just disappears usually restores the bath to a normal condition.

In general, too low a pH will lessen the cathode efficiency and will cause rapid anode attack in an idle bath. Too high a pH results in coarse-grained, dark and spongy deposits.

The cyanide-zinc bath possesses excellent throwing power and generally is only used for producing very thin deposits. The working range is narrower, however, the optimum pH having

been found to be 13.4. This type of solution, in the past, has been subjected to more variation in composition than perhaps any other type of plating solution. It is now recognized that adherence to fundamental compositions is necessary for bright, satisfactory deposits. Caustic soda is of importance for the proper operation of this bath as well as for proper efficiency.

The cyanide-copper process is widely employed and is operated in a narrow range of pH — 12.2 — 12.8. Average pH runs about 12.6. Close control is required here as far as adjustment of pH is concerned. Caustic soda will raise the value of the bath, but excesses are to be avoided, since acid is required to lower it. This in turn will liberate hydrocyanic acid gas which will be evolved into the atmosphere — a condition which is anything but to be desired.

One authority states that at a pH value of 12 the escaping hydrogen carries with it small quantities of sodium hydroxide which causes considerable irritation to the operator. This irritation ceases by lowering the pH to 10, but this, in many cases, gives rise to blisters. The latter is avoided by maintaining the bath at 11. Actually work along these lines is required to determine the optimum conditions for satisfactory deposits.

In the case of silver-cyanide solutions, the exact pH at which to operate is still a matter of controversy. In practice, a pH under 11.8 gives unsatisfactory results. Other sources say that 10.2 — 11.4 is a good working range. Frankly more data is required before anything definite can be said as to the optimum conditions for silver plating.

Various formulae have been proposed that appear to give satisfactory results. Since silver tends to plate out so rapidly and possesses poor adhesion, a "strike" is usually made. In such a solution the silver is kept very low, the cyanide very high. What is actually present in solution is a complex salt $NaAg(CN)_2$. This ionizes to a considerable extent, but the complex silver cyanide ion only does so to a very slight degree; thus is the silver ion concentration kept extremely low.

After the strike, plating is continued in a bath richer in silver. The free cyanide and carbonate assure a high pH value. The carbonate is important in that it assures proper anode corrosion and to a certain degree, determines the optimum cyanide con-

tent. It also influences the throwing power of the solution. Exposure to the air, as in an idle bath, as well as under ordinary working conditions causes loss in cyanide. Hydrolysis and oxidation occur. The cyanide has to be replenished at intervals as a result of this. Reactions of this kind would tend to affect the concentration of carbonate, in that its concentration would be increased. A series of experiments would be of great value, wherein pH were measured with variation in carbonate, both sodium and potassium salt, say in intervals of 1 oz. per gal. up to 10 oz., all other constituents being kept constant. Such work, I am sure, would be of great value to the industry.

Brass and Bronze plating are carried out under definitely alkaline conditions. Fluctions in pH lead to a variety of troubles, e.g., too high a pH leads to spotting; at a yet higher value, the spotting disappears. The color, however, is definitely reddish, not as rich as is obtained at a lower pH. Satisfactory results have been obtained within a range 9.8 — 10.2; 10.3 — 11 brings about spotting; 12 — 12.5 yields off-color deposits (unless specifically desired) but free from spots. Other sources maintain that 12.2 gives the best results as to color and freedom from spots. Since cyanide is employed here, also, care must be observed when it is desired to lower the pH, due to evolution of HCN. Only a very few examples have been mentioned from a host of different plating solutions. In these other cases, too, there are optimum pH conditions which will give the best results. These optimum conditions obviously will vary for different bath preparations.

It will be generally agreed, I think, that the control of pH is an important factor, and more and more attention is being paid it, now that a rapid, simple and economical method is available for this work. The colorimetric method is simple, but depends upon an operator's ability to know colors and especially to match them. It would never do to be color-blind in this respect, and a surprising number of people are, and do not know it. The colorimetric method, moreover, becomes involved when one has to deal with colored or turbid solutions. The electrometric method, on the other hand, eliminates all these sources of error, at the same time being every bit as rapid and, in the long run, far more accurate.

A Message from the Research Committee

A meeting was held at Washington on September 12. All but one member of the Committee attended. Besides, we had a number of guests who contributed to the discussion.

All the steel samples for the going program to determine the effect of polishing of base metal on the life of the coating will have been installed on the racks at three locations, New York City, Sandy Hook, and Washington by October 1. Most of the Washington samples had been installed and were inspected during the meeting. By getting the steel samples out now some information should be available by next spring. The tentative schedule on the polishing and plating of wrought brass, cast brass and zinc base die castings was reviewed and approved with some minor changes. This unfinished work should be under way by early October, although there may be delays coming due to the times that we are passing through.

The Committee recognizes its obligation to help the Society as a whole in every possible way. Unquestionably many individual members are faced with problems. In our discussion of this situation there were no definite suggestions as to how our Research Associate and his Assistant could fit into the picture in so far as carrying out experimental work on ways and means to meet the present situation. The consensus of opinion is that a specific long-time research program with a definite objective is to be preferred to a project or projects requiring slam-bang work and quick results. Even so, a resolution was adopted unanimously authorizing Dr. Blum to sidetrack the program, at any time he saw fit, for problems connected with the Defense Program and also for any urgent need coming from the Society.

It was suggested that the Research Committee initiate a move to get together information on such newly important subjects as for example lead and perhaps bronze plating. Anyone who can contribute to such or related problems or suggest something helpful to members who are now beset with problems coming from shortages of plating materials is asked to pitch in with something for the REVIEW. We expect to have a paper on lead plating in the next issue of the REVIEW. The plan is to set up a clearing house for such information. We will see whether this works out.

As has often been stated we are your Research Committee. You are the sponsors and through you the funds are collected. Therefore, each and every member should feel privileged to criticize our program, our decisions, and make suggestions.

For the Research Committee, ERWIN SOHN, *Chairman*.

The Fundamentals *of* Electrochemistry *and* Electrodeposition

III. Ions in Solutions of Electrolytes

Electrolytic and Metallic Conductors

By SAMUEL GLASSTONE,
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SOLUTIONS of strong acids, such as hydrochloric and sulfuric acids, of strong bases, such as sodium and potassium hydroxides, or of many salts in water are able to conduct the electric current efficiently. Such conducting solutions are generally known as "electrolytic" conductors or, briefly, as "electrolytes." They differ from metallic conductors in an important respect. The passage of an electric current through a solution is always accompanied by a transfer of matter; this becomes evident at the plates, or "electrodes," used for conveying the current into and out of the solution. With a metallic conductor there is no such movement of matter, and even if two or more different metals are joined, no change can be observed at the junction between them. On the other hand, some form of chemical action, such as the plating out of a metal or gas, is always observed at the junction between a metallic conductor and an electrolytic solution.

Ions in Electrolytes

The difference in behavior between metals and electrolytes when conducting an electric current is due to the fact that in a metal the current is carried by electrons only and there is no movement of particles associated with matter. In electrolytes the current is carried by positive and negative ions which, as seen in the previous articles, consist of atoms or groups of atoms that have acquired special stability by losing or gaining one or more electrons. Since these ions are material particles, made up of various elements, the flow of the electric current, which is accompanied by the movement of these particles, must be associated with the transfer of matter.

Ionization of Sodium Chloride

Before proceeding to describe the mechanism of the conduction of electricity through a solution, we may consider how the ions are produced in the electrolyte. It was seen in Part I (August, 1941) that a positively charged sodium ion (Na^+) owes its stability to the loss of an electron from an atom of sodium, while the stability of the chloride ion (Cl^-) is to be attributed to the gain of an electron by a chlorine atom. When the elements sodium and chlorine are brought together they react vigorously forming sodium chloride, i.e., common salt. The vigorous reaction can be explained by the transfer of an electron from a sodium atom to a chlorine atom, thus forming the stable ions Na^+ and Cl^-. It seems, therefore, that sodium chloride should consist of a combination of sodium and chlorine *ions*, and not of sodium and chlorine atoms. This view finds support in the results of X-ray examination of crystals of sodium chloride; there is apparently no evidence for the existence of sodium chloride molecules, due to the combination of atoms of sodium and chlorine, but the crystal seems to consist of interlacing structures of Na^+ and Cl^- ions. The general conclusion to be drawn from the foregoing arguments is that the solid salt, sodium chloride, consists of electrically charged positive and negative ions which are held together by electrostatic and other forces of attraction. In other words, we may say that the salt is ionized even in the solid state since there are equal numbers of positive and negative ions in the interlacing structures; however, the whole crystal is electrically uncharged. In view of the presence of ions in the solid salt, their existence in solution presents no difficulty; as soon as the salt is placed in water the forces which hold the ions together in the crystal are overcome and hence the ions become free to move in the solution.

Ionization of Salt in General

The general arguments just presented to account for the origin of electrically charged particles, or ions, in a solution of sodium chloride apply equally to many other salts. It is true that there are a few exceptions, particularly certain mercuric salts, but on the whole it may be stated that in the solid state most salts consist of positive and negative ions held together by electrostatic forces. As soon as these salts are dissolved in water the

ions become free to move and hence are liable to conduct the electric current. It was considered at one time that the ions were formed only in solution, but the view now generally accepted is that there is ionization even in the solid, and the solution provides conditions for free movement of the ions. A certain amount of electrostatic attraction between the oppositely charged ions persists in the solution so that the ions cannot be regarded as completely free, except possibly in very dilute solution when the ions are relatively far apart. It may be noted that this is the basis of the modern theory of strong electrolytes, associated with the names of Debye and Huckel; according to this theory most salts may be regarded as completely ionized in solution, but the existence of electrostatic forces between the ions influences the behavior in a manner which depends on the concentration of the solution.

Ionization of Acids and Bases

Although the strong alkalis, like the hydroxides of sodium and potassium, are similar to salts in their electrical properties, the ions, e.g., Na^+ and OH^-, being present in the solids, the ionization of acids of all kinds and of weak bases involves a somewhat different principle. It was noted in Part II (September, 1941, p. 727) that the hydrogen ion, which is the characteristic ion of acids, has the formula H_3O^+ in water. The ionization of an acid consequently *does* depend on the action of the water. Pure hydrochloric acid and pure sulfuric acid are practically non-ionized; it is only when the acid, e.g., HCl, is dissolved in water that the ionization reaction $HCl + H_2O = H_3O^+ + Cl^-$, resulting in the formation of hydrogen and chloride ions, takes place. The extent to which the ionization reaction occurs determines the "strength" of the acid. A strong acid, such as hydrochloric acid, reacts to such a great extent with the water that the solution contains almost entirely H_3O^+ and Cl ions with very few HCl molecules. With a weak acid, such as acetic acid (HAc), however, the corresponding reaction, $HAc + H_2O = H_3OP + Ac^-$, occurs to a limited extent only; the extent of ionization of a weak acid is consequently small. The solution of a weak acid is, therefore, a poor conductor of electricity and is known as a "weak electrolyte," while the solutions of most salts and of strong (mineral) acids are referred to as "strong electrolytes."

Solutions of weak bases, such as ammonia (NH_3), are also weak electrolytes; in these cases the reaction with water, which is involved in the ionization process, e.g., $NH_3 + H_2O = NH_4^+ + OH^-$, occurs to a limited extent only, with the result that the solution contains mainly NH_3 molecules and relatively few NH_4^+ and OH^- ions for carrying the current.

CORRECTION

On page 632 of the August 1941 issue of the REVIEW appears the statement "triply-charged ions in solution are unknown"; it is evident from the context that this statement applies to *simple ions consisting of a single element.* Complex trivalent ions, such as PO_4^{---} and $Fe(CN_6)^{---}$, and even quadrivalent ions, such as $Fe(CN)_6^{----}$, are of course well known.

SUPPLIES AND DEFENSE

By W. D. STARR
The Lea Mfg. Company
Waterbury, Conn.

A great number of small factories including firms doing plating have been hard hit by the Priorities System. Lacking sales facilities for lining up defense work, their supplies have been restricted or cut off for want of priorities. The real problem is how to place Defense business with these concerns. The OPM fully appreciates that their facilities and skilled labor can be highly important to the whole program. Shut-downs and unemployment are not wanted.

If such firms can hold out a little longer there is good indication that both defense business and needed supplies will come their way. The OPM Contract Distribution Division headed by Floyd B. Odlum is organizing a nation-wide field staff to promote sub-contracting. The former Defense Contract Service is absorbed and facilities greatly expanded. Concerns needing Defense work should write the Division at Washington for the address of the field office they should contact.

Another bright spot in the offing is the proposed change from priorities to an allocation system. The plan now being studied would serve to ration available supplies to industry on the basis of over-all requirements with accent of course on Defense. Such a plan, it is believed, would better comprehend the needs of small users and prevent a waste of their production capacities.

Meanwhile the present priorities system is in full swing with most plating supplies in the same situation as last month. Lead priorities are now forecast by some observers. The Priorities Division is giving prompt attention to applications and a fine spirit of cooperation is evident from both headquarters and district offices. Anyone with problems should not hesitate to either write OPM at Washington, or make an appointment to call at the office serving their district.

Quality *vs* Physical Tests *of* Hide Glue

By O. V. SIMONSON
Read at Hartford Branch Meeting, January 20, 1941

THE manufacture of glue is by no means a recent discovery. In fact, it was used as far back as the ancient Egyptians. Proof of this was found in the tomb of Old King Tut, which was opened a few years back. The tomb yielded many wooden articles glued with hide glue. I have no doubt that the early Egyptian salesmen were kidded much the same as we are today about being stuck on our job. Evidence of glue being used is found all through history, but it took the early pioneers of New England to find the raw material which gave the best glue. They found that the hides of animals with horns gave a much better product than any of the other hides and this discovery holds to this day, as almost every manufacturer of quality hide glue uses as his basic raw material the hides of horned animals.

Skins of various types arrive at the factory and it is up to the Superintendent to grade and select the proper blend; that is, a certain percentage of sheep skin, deer, mocha and calf skin, etc. In this way the quality of the glue is controlled from year to year.

The hides are now placed in a washing machine where all surface dirt and foreign material is removed. They are then transferred to a lime vat, covered with water and an excess of lime. The operation requires from 12 to 14 weeks, depending on the condition and type of stock. The liming process removes all hair and fat which may be clinging to the hides. It also swells or plumps the skins preparatory to the extraction of the glue in the cooking vats. The hides are now removed from the lime vats to another rotary washer. Incidentally, I might add that the lime and water from the vats is run into a settling basin. Here the water seeps through the ground while the lime and accumulation of hair remains. This residue is collected about once a year and sold for fertilizer material. You will see as we go along that the glue manufacturer does not discard any part

of the hide. I understand the meat packers use everything but the squeal. I think the glue manufacturer could probably find a use even for this.

The limed hides are washed continuously for 24 hours with pure lake water to remove all traces of surface lime. However, within the creases of the hide, lime particles remain. To remove the last traces of lime, we add muriatic acid and then a final wash to remove the excess acid. The hides are now ready for the boiling tub consisting of a large wooden vat lined with steam coils and covered with cold water. The temperature is raised to 180 degrees F. and allowed to steep for one hour. This produces a glue liquor or cook containing about two percent glue of the highest quality. The glue liquor is drawn off and cold water added to the boiling tub and the process repeated four times. In this way, different grades and tests of glue are obtained.

The two percent glue liquor is transferred to vacuum evaporators and some of the water removed at very low temperature in order to prevent breaking down of the glue, the same procedure being carried out with each successive cook. The concentrated glue solution now contains about 10% glue and has a fairly high viscosity. It is now carried by pipe line to a refrigerated jelling machine. The glue flows from the pipe onto a moving rubber belt and is carried in an endless stream to the other, coming out in the form of a glue jelly. It is cut into 6′ lengths and spread on wooden frames covered with special wire netting. These frames holding the glue jelly are placed one on another in piles of about 7′. These are then run into the drying alley. A large fan draws heated air through this alley, picking up the moisture and leaving a dry sheet of glue. It takes about three days for this drying operation. The dry sheet of glue is then broken up by a cracker into glue flakes, and these in turn are put through a grinding mill and ground to any mesh desired. The final product contains about 12 to 14% moisture.

We have covered the making of glue from start to finish. Let us go back and examine each step and see what determines the quality obtained in glue. A capable glue manufacturer knows that mocha and calf skins produce the highest grades of glue. But they also know that these hides cannot be obtained in sufficient quantities year in and year out. Therefore, he must blend

these hides with the balance of his stock so that the characteristics of his glue remain the same from year to year. This is obtained by very few manufacturers. No doubt you are wondering why I stress this fact so much. The truth is that the glue we offer today as being most efficient for abrasive work is, in reality, our third cook or third-run glue. You couldn't possibly use our present day first run glue for abrasive work, as it would set too fast and be much too expensive.

Years ago, hides of all types were brought to the glue manufacturer haphazardly, and he limed and cooked them in the same way. As a result, he obtained a glue as his first run or best grade of much the same test that you are now using. Many users of glue for abrasive work insisted upon a first-run glue; many still do. As a matter of fact, the old first-run glue was a much more inferior product than the glue now being offered for abrasive work—although the two glues have the same physical tests.

Now let me enumerate the steps necessary to bring you the highest quality in abrasive glue:

1 — The hide stock is carefully selected and graded.
2 — The liming of the stock is watched and the temperature of the lime bath carefully controlled.
3 — Exact washing of the lime stock.
4 — The lowest temperatures possible are used for each extraction. Insuring a minimum of breaking down of the glue.
5 — Speed of changing glue liquor to dry glue.

If the glue liquor is allowed to remain at a high or medium temperature for any great length of time, the test and quality of the glue is lost. In the old days, it took about 12 hours to get the glue liquor into jelly form and into the drying alley. Today this requires about 30 minutes. This makes for a better glue. The glue manufacturer has now, to the best of his ability, produced a glue which will give you a maximum of efficiency in your wheel room. The rest is up to you.

Before I begin on the errors which creep into the modern polishing room, let me ask you one question: How many of you have had your polishing room technique checked by a competent glue man within the last five years? It is my advice that you should have this done at least every two years, and I'm sure your glue supplier will be glad to do this. I stress this so

much because so many wheel rooms gradually decline to such a state of inefficiency that it is called to the attention of the front office. This means a general shake-up and possibly a change of glue. As a matter of fact, nine times out of ten, it isn't the fault of the glue at all.

The following are some of the conditions I have found in a well ordered set-up room: A new man had been shown how to set up wheels and followed his instructions for some time. The old glue brush wore out and he requisitioned a new one. The new brush, however, did not have a wire to hang it in the glue pot. So, as a result, he took to laying the brush on a wooden board beside the glue pot. This had no effect on the first few wheels he made up, but after a while the glue in the center of the brush became jellied. Then, when he dipped the brush into the hot glue, only the outside of the brush got the hot glue. As a result, half the wheel or center got cold glue which refused to hold any abrasive, and pieces of glue and abrasive flew off at the first turn of the wheel.

Another fault found is that the room is too hot, especially in winter when steam heat is used, with no ventillation. This causes excessive drying of the glue and poor holding of the abrasive. Another fault which I cannot stress too much is that the glue is used entirely too heavy. As a matter of fact, the thinner the right grade of glue is used, the better it will hold. There are many other faults found in almost every polishing room.

NEW TUMBLING EQUIPMENT FOR MACHINE GUN PARTS

A new Mercil type of equipment for tumbling or cutting down machine gun parts is offered by Hanson-VanWinkle-Munning Company, Matawan, N. J. Before these machines were developed, the burrs on the machine gun parts were removed by filing by hand. This barrel gives a much better finished product than does filing by hand.

The units are built along the same line as the Mercil oblique barrels using ½HP, totally enclosed ball bearing motors, direct connected to a worm and worm gear reducing unit. The slow speed shaft on the worm gear revolves the cast-iron bottle-necked barrels. Timken bearings are used throughout. The cast-iron barrels are octagon shaped, 13¾″ deep with 5¼″ opening at the top and approximately 9½″ across the flats. The cylinders are raised and lowered by means of a lever. Directly under the cylinders is a sump tank or drain tank and also a perforated tray or basket. The operator unloads the contents of the cylinders into this tray and then flushes it out with a hose, the water and residue going into the sump tank directly underneath. These tanks have a 2″ drain in the center which is connected to the sewer.

The small machine parts which are processed are run with silica sand and oil, from two to four hours, depending on the size of the load and the size of the pieces from which the burrs are to be removed. These units can be built in single or multiple type.

Nickel Plating Without Nickel Chloride

By MYRON B. DIGGIN
Chief Chemist,
Hanson-VanWinkle-Munning Co.,
Matawan, N. J.

WITH nickel chloride scarce at the present time the question of a substitute has been raised many times during the past few months. The essential function of nickel chloride is to furnish chlorine ions to the plating bath to promote satisfactory anode corrosion. In low current density room temperature plating solutions, ammonium chloride or perhaps under some conditions, sodium chloride, can be used to maintain the correct chloride concentration. In warm or bright nickel solutions the presence of appreciable amounts of sodium or ammonium ions is objectionable. It is, therefore, necessary to use chloride in some form which is not combined with harmful metals or radicals. The only two materials which can be recommended at the present time are hydrochloric acid and magnesium chloride.

Hydrochloric acid can be used for adjusting the pH value of the bath. In most nickel solutions the pH tends to rise. Daily additions of sulphuric acid are required for pH constancy. If hydrochloric acid is substituted for sulphuric acid the pH can be adjusted and the chlorine ions increased simultaneously. By this method the chloride concentration of a solution very low in nickel chloride cannot be brought up to normal immediately as this would result in an excess of acid. Over a period of weeks, however, the chloride will increase until a sufficient quantity is present, at which time the use of hydrochloric acid can be discontinued and sulphuric acid employed in the usual manner. If an analysis indicates that the chlorides have dropped in concentration, hydrochloric acid is again substituted.

If nickel carbonate is available, nickel chloride can be formed by neutralizing the carbonate with hydrochloric acid either in the plating tank, or perhaps with greater safety in a separate tank, in which case the solution can be filtered back into the main tank.

Either C. P. or commercial grade of hydrochloric acid can be used in low temperature-low current density baths. The latter

acid is sold as 22° Bé. muriatic acid. Most dealers in heavy chemicals and acids will be able to furnish a grade low in heavy metal impurities. If large quantities of acid are required especially in high current density - high purity solutions, the use of the C. P. material is recommended as the commercial HCl contains appreciable quantities of iron. Eight-tenths of an ounce of acid is equivalent to 1.0 ounce of nickel chloride. In other words eight pounds of acid will yield the same chloride concentration as ten pounds of commercial nickel chloride.

In the other substitute for nickel chloride mentioned above, magnesium chloride, magnesium ions are not harmful when the concentration calculated as magnesium chloride is below 3.0 ounces per gallon. In some cases higher concentrations have been used but there is some danger of forming hair-line cracks in the deposit. Magnesium salts have been used up to the concentration mentioned in cold and warm nickel solutions and in bright and semi-bright cobalt-nickel solutions. In using magnesium chloride (U.S.P. or C.P. grades) it should be borne in mind that 0.85 pounds of this salt are required to furnish an equivalent chlorine concentration obtained with 1 pound of nickel chloride. Not more than 3.0 ounces per gallon should be added. If a higher chloride concentration is needed, the difference should be made up by using hydrochloric acid as outlined above.

Magnesium metal is on the priority list which makes it doubtful whether supplies of high purity magnesium salts are obtainable. The commercial grade of magnesium chloride contains a relatively high proportion of calcium salts, making it undesirable for additions for plating baths.

It must be emphasized that thorough drainage of work after plating and the installation of reclamation tanks will not only save nickel metal but will assist in preserving the proper chloride concentration in the bath. Under normal conditions, chlorides are not consumed in the plating operation but are lost almost entirely by drag-out.

Porous Cup Method

The suggestions given above will in most cases take care of chloride deficiencies. In extreme cases, nickel chloride can be produced in the bath by adding calculated quantities of hydro-

chloric acid directly to the solution and then operating a porous cup on the cathode rod until the pH has risen to the normal value. A 5% solution of sulphuric acid and lead anodes should be used inside of the cup. The arrangement suggested is identical with the type of porous cup that is used in chromium solutions. The cup is of the same porosity as is regularly furnished to chrome users; also the perforated anode is identical. The use of a 5% sulphuric acid in the cup is suggested to furnish conductivity; if some is allowed to splash over in the plating solution no irreparable damage will be done. The porous cell is hung on the cathode rod and the current turned on.

If it is desired to increase the nickel chloride concentration of the bath by 1.0 oz./gal., then 0.8 oz./gal. of hydrochloric acid is added to the bath. The current is allowed to flow until the pH has risen to the same value which obtained before the hydrochloric acid was added to the solution. It requires 414.33 ampere hours to take one pound of nickel into solution. One pound of nickel metal will produce four pounds of nickel chloride. It will therefore require 103.58 ampere hours to produce one pound of nickel chloride. Dividing this figure by 16 we find that it requires 6.47 ampere hours to obtain an increase of one ounce of nickel chloride. If it is possible to draw a current of 65 amperes through the porous cell it will then require 10 hours of electrolysis to raise the nickel chloride concentration one ounce per gallon in a 100 gallon solution.

The advantage of the porous cup method is that no foreign substances are added and furthermore that the pH can be brought back to normal without the addition of nickel carbonate or other acid neutralizing substances, some of which are almost as difficult to obtain as nickel chloride itself.

CADMIUM PRODUCERS WILLING TO KEEP 90- AND 95-CENT PRICES

(From *Defense*, August, 1941.)

Major producers of cadmium have indicated to the Office of Price Administration their willingness to continue to sell that metal at prices not above 90 cents a pound for sticks and 95 cents a pound for anodes, in the case of direct sales to users, and to sell to dealers at discounts which will permit resales to consumers at not above 90 cents and 95 cents, Administrator Leon Henderson announced August 30. Prices above these levels are considered excessive and consumers are requested not to pay them. If cadmium is needed urgently and cannot be obtained at 90 cents a pound for sticks and 95 cents a pound for anodes, Mr. Henderson suggested that consumers communicate with the Office of Production Management.

FILMS PRODUCED BY UNITED STATES STEEL CORPORATION AND SUBSIDIARIES

(*Editor's Note* — For the benefit of the branch librarians and others, we are publishing the list of available films to be used at branch meetings. These were submitted to us by the chairman of the Educational Committee, Mr. C. C. Conley, Dayton, Ohio.)

Requests for booking the films produced by United States Steel Corporation and Subsidiaries should state width of film desired and type (sound or silent). When 35mm. prints are required, request should state if facilities permit use of nitrate prints. Alternate subjects and dates should be given wherever possible. It is suggested that the borrower contact the nearest Film Distribution Center. All subjects listed, unless otherwise indicated, may be obtained from each of the Distribution Centers listed below:

PITTSBURGH FILM DISTRIBUTION CENTER
C. R. Moffatt, Director of Advertising, United States Steel Corporation of Delaware, 436 Seventh Avenue, Pittsburgh, Pennsylvania.

CHICAGO FILM DISTRIBUTION CENTER
A. C. Wilby, Assistant to Vice-President, United States Steel Corporation of Delaware, 208 South LaSalle Street, Chicago, Illinois.

NEW YORK FILM DISTRIBUTION CENTER
Robert T. Dalton, Advertising Department, United States Steel Corporation of Delaware, 71 Broadway, New York, New York.

BIRMINGHAM FILM DISTRIBUTION CENTER
LeRoy Holt, Sales Promotion Director, Tennessee Coal, Iron & Railroad Company, Brown-Marx Building, Birmingham, Alabama.

CLEVELAND FILM DISTRIBUTION CENTER
W. H. Cordes, Manager, Sales Promotion — Advertising, American Steel & Wire Company, Rockefeller Building, Cleveland, Ohio.

SAN FRANCISCO FILM DISTRIBUTION CENTER
J. B. Du Prau, Director, Commercial Office, Columbia Steel Company, Russ Building, San Francisco, California.

Conditions Under Which Films Are Loaned

1. Exhibitors are responsible for film damage.
2. No rental charge is made.
3. A 16mm. sound print must be projected only on 16mm. sound projectors which have but one row of sprocket teeth. Projection on a silent machine will ruin the film.
4. Be sure the gate and other parts of the projector are clean and free of excess oil. Do not allow film to touch a dusty surface. This is not only detrimental to the film, but introduces dirt to the projector parts. Be certain the projector is in proper adjustment.
5. Films are to be projected as received. Leaders and trailers must not be removed for joining to other reels of this subject or to other subjects. Do not punch the film or add any other permanent markings.
6. Thread the picture on the plain leader, not on the title. Turn the mechanism by hand to be certain sprocket teeth are properly engaged. Then after projecting a few feet of the leader, stop the machine and examine the film. Never run into the opening title without examining projected leader for damage.
7. When rewinding between shows do not tighten or bind film on the reel. This causes serious scratches and other marks. Running the film through a cloth or the fingers is also a common source of scratched prints and should be avoided.
8. If splicing is necessary, it should be accomplished in an expert manner and only with suitable film cement on a splicer designed for the particular type of film.

9. Ordinary films should not be rewound after last showing. Returned reels should be of the same manufacture, type, and size, and in the same condition as reels sent. If such reels are not available, rewind film and return on original reels.
10. Damaged prints disrupt schedules and may cause disappointment to other borrowers. Your cooperation in keeping prints in first-class condition will be appreciated.
11. Films must be reshipped under cover of the label enclosed in the shipping case immediately after showing. If it is desired to hold film beyond reshipping date specified, permission must be obtained in advance of such date. Coupon for return by express prepaid at one-half first class rate is enclosed in shipping case. Return shipments by parcel post must be marked special delivery. (Films are ordinarily shipped express prepaid. On request they are sent parcel post special delivery.)
12. Report form is to be completed and returned after the showing.

The Making and Shaping of Steel (7 reels)

Sound-on-film: 35mm. — 16mm.
Silent: 16mm.

Note: (A) 16*mm. silent versions* are offered in 400 foot reels. Any combination of reels will be furnished. Where mounting of several such reels on one large reel is desired the request should so state. Such mounting by exhibitors is not permitted.

(B) 35*mm. sound versions* are offered on 1000 foot reels. Any combination will be furnished. Where mounting on 2000 foot reels is desired the request should so state. Such mounting by exhibitors is not permitted. When two projectors are available, the 1000 foot reel should be used.

(C) 16*mm. sound versions* are ordinarily offered on 1600 foot reels, Reels I, II, III, and IV on the first and Reels V, VI, and VII on the second. Other combinations are available for special purposes. Such special mountings must be requested when booking is made. Special mountings by exhibitors is not permitted.

(D) *It is suggested* that Reels I and II be included in any combination requested unless such reels have been used in previous showings to the same group.

(Running time *each reel*: Sound, 10 minutes; Silent, 15 minutes.)

REEL I RAW MATERIALS. Begins with open pit and underground mining of iron ore; its transportation and delivery. In addition to the iron ore, the quarrying and crushing of limestone, coal mining and coke manufacture, and finally the production of iron in the blast furnace are shown in detail.

REEL II THE MAKING OF STEEL. Open hearth, electric furnace, and Bessemer converter processes convert iron into steel. Scenes of all operations; charging the materials, test samples, tapping, filling ingot molds, and soaking the steel ingots preparatory to rolling are clearly shown and described.

REEL III FLAT ROLLED PRODUCTS. Modern mills of all types have been filmed rolling steel, hot and cold, into a variety of products —plates, strip, sheets, galvanized sheets, and tin plate, through progressive steps that are easily understandable.

REEL IV BARS AND STRUCTURAL SHAPES. From the billet, steel through rolling becomes reinforcing bars in a continuous mill, or I beams, angles, or Z shaped piling in other structural shape rolling mills. Finally, the uses to which these products are put flash across the screen.

REEL V RAILS, WHEELS, AND AXLES. A rail mill and its product; heat treating and end-hardening by Brunorizing, and the spectacular drop test. We see also how axles are hand forged and machined before service, and how wheels are wrought, machine finished, and inspected.

REEL VI WIRE AND WIRE PRODUCTS. Steel wire for nails, fences, cables, watch springs, bridges, and thousands of other uses comes from a red hot billet processed by modern continuous rod mills and cold drawn to final size. Steps in the manufacture by rolling and cold drawing also show pickling, liming, and drying. Slow motion of barbed wire manufacture allows detailed study.

REEL VII PIPE AND TUBE MANUFACTURE. Seamless tubes made by piercing a solid round steel billet, butt-welded pipe and cold drawing processes are vividly shown and clearly explained by animation as well as mill scenes. Piercing, rolling, reeling, sizing, and testing are necessary operations; all shown and described in detail.

This film is also distributed on 400 ft. reels in 16mm. *silent* by: United States Bureau of Mines, Experiment Station, 4800 Forbes Street, Pittsburgh, Pa.

Steel — Man's Servant (4 reels) — Technicolor

Sound-on-Film: 35mm. — 16mm.

(Running Time — 38 minutes)

This is the first documentary industrial film made in technicolor complete with sound and orchestration. Narration is by Edwin C. Hill and music by Robert Armbruster's orchestra.

Motion picture theaters found this unique industrial all-color film to be an outstanding attraction and millions have been thrilled by its beautiful music, sound, and vivid description of the steel industry from the mining of the iron ore to the finished product.

It is now offered for the first time on 16mm. sound-on-film.

USS Cor-Ten (2 reels)

Sound-on-Film: 35mm. — 16mm.

(Running Time — 20 minutes)

This is the story of a new alloy high tensile steel and its use in the transportation field and allied industries. Highlights show tests, the importance of weight saving in design and long-run savings in cost.

Bridging San Francisco Bay (4 reels)

16mm. Sound-on-Film only

(Running Time 45 minutes)

For a great many years men said this major navigable waterway could not be spanned. Yet here it has been done, and the story of this feat begins with the plans and covers the sinking of the foundations, general construction of the superstructure, cable spinning, erection of catwalks, and countless interesting steps in its amazing growth to 43,500 feet from Terminal to Terminal.

Sound Slide Films

These are 35mm. film strips designed for still projection only on equipment especially made for the purpose. A 16″ record carries the voice, music, and sound effects. The projector should have a turntable for 33⅓ R.P.M. records. The records cannot be used on standard home equipment unless such equipment has provision for speed of 33⅓ revolutions per minute. Each subject requires 15 minutes screening time.

And So To Sleep

Sales promotion films featuring U.S.S. Premier Spring Wire. Mr. Premier Tag, an amusing character, assists a young married couple in solving their domestic problems and getting a good night's sleep, guiding them in their selection of bedding equipment. Suitable for sales training use or educational

entertainment for civic and women's groups, high school and college home-making groups, home demonstration agents, etc.

Other Sound Slide Films

1. Where Does Steel Go?
2. Steel Stands the Gaff.
3. What It Takes to Make Steel.
4. The Steel Dollar — Where It Goes.

These four subjects produced by the American Iron and Steel Institute.

Other Films Available

The following special subjects may be procured from the source indicated for each. They are not available from the regular Distribution Centers shown on page 1. ARTERIES OF INDUSTRY — the story of modern steel pipe, 6 reels, 16 and 35 mm., 90 min.

Reel I Mining of ore-blast furnace operation—Bessemer Converter process of making steel.
Reel II Open hearth process of making steel—blooming and rolling mill operations.
Reel III Butt-Weld process of making pipe—galvanizing pipe.
Reel IV Lap-weld process of making pipe and tubes.
Reels V & VI Seamless process of making pipe.

Address inquiries to National Tube Company, Frick Bldg., Pittsburgh, Pa., or Columbia Steel Company, Russ Bldg., San Francisco, Calif.

Construction that Endures (1 reel)

Silent 35mm. and 16mm.
(Running Time — 15 minutes)

A Story of Concrete and its uses. Shows various ways in which concrete is employed in fireproof and durable construction—buildings—bridges—highways—statues, etc. Address inquiries to Universal Atlas Cement Company 135 East 42nd Street, New York, New York.

Follow the White Traffic Marker (1 reel)

Silent 35mm. and 16mm.
(Running Time — 15 minutes)

Highway safety—accidents and prevention.

Address inquiries to Universal Atlas Cement Company, 135 East 42nd Street, New York, New York.

From Mountain to Cement Sack (1 reel)

35mm. and 16mm.
(Running Time — 15 minutes)

The story of the manufacture of Portland Cement.

Address inquiries to Universal Atlas Cement Company, 135 East 42nd Street, New York, New York.

Walls without Welds (4 reels)

Silent 35mm. and 16mm.
(Running Time — 60 minutes)

The story of seamless steel pipe and tubes.

Reel I Mining of ore—blast furnace operations—open hearth process of making steel.
Reel II Blooming Mill and rolling mill operations—manufacture of hot finished pipe and tubes.
Reel III Manufacture of hot finished pipe and tubes (continued)—cold drawing of seamless pipe and tubes.
Reel IV Cold drawing of seamless pipe and tubes (continued)—special forming operations.

Note: Various scenes illustrated with animated diagrams.

Address inquiries to National Tube Company, Frick Building, Pittsburgh, Pennsylvania, or Columbia Steel Company, Russ Building, San Francisco, California.

METAL PROTECTIVE FINISHES

(Reprinted from *Steel*, September 8, 1941, Issue)

By J. A. Meacham, Manager
Maintenance Division, Sherwin-Williams Co.

Red Lead, lead chromate, zinc chromate and blue lead pigments have shown that they do retard and inhibit corrosion. Therefore, as a preliminary step, every metal surface should be coated with an inhibitive primer of this type. The finish coats applied over the primer must protect the primer and, therefore, must be essentially resistant to the destructive influence of weather, sunlight and such fumes as may be present. Paint vehicles using synthetic resins have greatly increased water resistance, hasten drying, make harder and tougher finishes, and materially improve the appearance of outside paints by enabling them to retain their gloss for longer periods of time. Synthetic vehicles are used on metal surfaces both in primers and finish coats, for normal outdoor or indoor exposures as well as for severe fume conditions.

In general, alkyd synthetic finishes perform best out-of-doors on metal, since they have the ability to retain their gloss under sunlight and have outstanding weather durability. Phenolic synthetic vehicles are selected for a maximum resistance to acids, alkalis, and moisture. The desired pigment combinations may be used in both types of synthetic vehicles.

How Thick A Film?

It can be demonstrated that the ability of a paint film to resist the passage of water is in direct proportion to the film thickness. More and more we are coming to bel eve that a greater total thickness of paint increases the protection afforded. For this reason, the application characteristics of a paint are important. It must apply readily so the operator can produce a full, uniform coat on all parts of the structure. If the paint pulls unduly, the result is uneven distribution with too much paint on one part of the surface; too little on another. If the paint is too thin, it flows out into a thin film which does not give the required protection. If it dries too slowly, the film may be injured in handling. With paints of proper consistency, as many as four coats are now being recommended for new work on important structures, usually consisting of two priming coats and two finishing coats. One priming coat is applied in the shop; a second coat of primer in the field after erection. This covers any skips in the first shop coat or abrasions caused in transit. The two additional finish coats then afford the necessary protection for the primers. Of course, good protection can be achieved with 3-coat work, that is, one primer and two field coats.

Aluminum paint with properly selected vehicles gives good results over an inhibitive primer. The individual flakes of aluminum overlap in horizontal layers, increasing the distance that moisture must travel from the outer surface to reach the steel. This, in effect, increases the net thickness of the film.

Preparation of Surfaces

No phase of metal protection with paint is more important than surface preparation. Rust, mill scale, and foreign material must be removed before painting. Mill scale is an oxide of iron, formed on the surface in the process of rolling. If it were a continuous film, firmly adherent at all points, it would of itself be an excellent protection against further oxidation. But it is not continuous and numerous weak spots permit moisture to enter so rusting takes place under the scale, eventually forcing off both the scale itself and the paint which is applied over it. Complete removal of all loose mill scale is necessary by pickling, sand-blasting, wire brushing, weathering, chemical treatment, or flame cleaning. At least that which is not tightly adherent to the metal must be so removed.

Of course, pickling is hardly practicable for structural steel work, being confined to work easily handled. Sand blasting is effective but has the disadvantage of making the exposed steel likely to corrode very rapidly, so it

must be painted immediately. Wire brushing by hand or power driven brushes will remove loose scale. If the work is well done, this is a satisfactory means of preparing steel for painting. Leaving the steel exposed to the weather for considerable periods of time will remove the scale but a coat of red rust develops, so is not satisfactory.

Phosphoric acid treatments convert the steel surface into a deposit of iron phosphate which destroys existing rust and passifies the surface so that further rust does not form easily. Under closely controlled conditions, as for example in a shop on a manufactured product, this method is highly effective. In structural steel work, it is easy for excessive quantities of the phosphoric acid to accumulate in pools and crevices. Applying paint over such areas invites trouble. Flame cleaning is a very recent development. Small, brush-like flames are moved over the surface and it is claimed that the heat drives out moisture and loosens mill scale effectively. This method offers excellent possibilities. For preparing a previously painted structure with steel heavily corroded, sand blasting is the best practical method.

Finishing Machinery and Equipment

For finishing machinery and equipment inside the plant use an inhibitive type of primer, such as lead or zinc chromate. Synthetic enamels make it possible to obtain beautiful finishes in a wide selection of colors with fine covering ability. They will dry quickly flow into a smooth gloss or egg-shell finish, as desired, and are highly durable. Special synthetic enamels of the phenolic type are available where chlorine and other chemical fumes create exceptionally severe conditions.

For certain metal surfaces largely hidden from view and not requiring paint for decoration, economical protection can be given by applying low cost bituminous paints frequently without the use of primers. These paints are black or very dark in color and do not present an attractive appearance but they do afford excellent protection at reasonably low cost. While much progress has been made, a few fundamentals continue to be of outstanding importance. The use of rust inhibitive chromate pigments for the priming coats; improved synthetic finishes; adequate film thickness; proper preparation of surfaces. These are the foundation stones for success in protection of metal surfaces wherever they may be found.

L. D. MOSHER COMPANY NOW IN CHICOPEE

The L. D. Mosher Company, manufacturers of Buffing and Polishing Compounds, are now located in their own building at 15 Exchange Street, Chicopee, Mass. Their old plant at Hayden Ave., Springfield, Mass., was recently destroyed by fire.

COOPERATE WITH YOUR EXHIBIT COMMITTEE

The Plated Ware Exhibit at our National Convention is becoming more important with each succeeding year. At the Boston Convention we were informed by Dr. Stratton of the OPM that at least 85% of some of the metals used in the plating industry were then being used for National Defense and that the percentage would rise month by month. Concerns who were not engaged in Defense work would have to find substitutes for those particular metals.

At our coming Convention at Grand Rapids, more than at any other time, we will have an opportunity to demonstrate what we have accomplished to cope with the present situation. It is an uncomfortable feeling for a Delegate to walk into the exhibit room and note that his Branch did not bother to send an exhibit to the Convention. Every Branch can either make their delegates feel proud or disappointed.

In order to equal the record of a 100% Exhibit established at Asbury Park, I must have the cooperation and support of every Branch. The transportation expenses to and from the Convention will be paid by the Convention Committee. GEORGE WAGNER, *Chairman Exhibit Committee*

ERNEST LAMOUREUX ELECTED TO HONORARY MEMBERSHIP IN SUPREME SOCIETY

I presume that Honorary Membership is supposed to imply that anyone so honored is expected to be put on a shelf and cease all activities. However that may be, I can assure you that I have no such inclination, but just to what extent I may be able to carry on during the ensuing period of the Branch activities is a problem with me at this time over which I have no control, but all of you can rest assured, especially in view of your wonderful tribute to me this evening, that I will not let you down.

The Boston Convention, from all accounts, attracted quite a large attendance, and by now all of its accomplishments are known to the rank and file in all of the Branches, and having had a Delegate present, and winning the excellent trophy on exhibit here this evening, we have created a reputation to protect and uphold, in the forthcoming months. The eyes of the entire Society will be upon us; it behooves all of us, therefore, to carry on to further achievements with dignity and determination to command the attention and high respect of the entire Society to enhance our chances to ultimately entertain a National Convention here.

The aim and object of our Society, as you know, is Educational, which in itself is more or less a serious matter, from which any sound and sensible humor, from time to time, serves as a relaxation. However, this too should be in line with, and have the same high quality as, the work of the Society itself; and we should guard against any silly pranks, however well intended, that might bring embarrassment to any member of our Branch.

May I point out here that there is plenty of work to do, and work that will require the best efforts of the best material in the Branch. We are on the threshold of a new season, with the regular routine of activities, including our forthcoming Annual Educational Session and Dinner Dance. Then too there is a sentiment prevailing that we make a real campaign to bring the 1943 Convention to Los Angeles. If it takes root, we must have much more in the way of assisting organization. There are plans now to create an Auxiliary for the ladies. There should also be developed a Goodfellowship Club. This, as you may or may not know, is composed of the salesmen of plating supplies and all of the lines thereto. Some means should also be created to bring about a more helpful understanding between the Branch and the Industry in this section. All of this is to assure a Convention in keeping with, not alone the record of Los Angeles as a Convention City, but a Convention to surpass any ever held heretofore by our Society.

In my capacity as Chairman of your Board of Managers I feel it incumbent upon me to point out some phases of the Branch work which many of you may not think about. In the general activities and Branch work it is very true that, for the most part, it is carried on by the older and more experienced members, your Board. The other officers, and some of the members are aware that there has been some criticism of this fact, and without justification; the members who have served you so faithfully, so ably, have not done so by choice but rather of necessity. The same group are constantly on the watch for any talent in the Branch to work with them or take their places, after the necessary experience and coaching, because, as all of you should know and understand, the Branch is no exception to the rule that ability and experience are necessary to carry on any phase of Branch work. At this point you are all aware that we have discovered quite a capable secretary for the Branch, and we have every reason to expect that he will go far in the Society.

We may have talent of equal ability among the Membership, but it will not bring recognition by being dormant, or, choosing to spend its time gossiping or talking shop with his neighbor at the tables during either the business or educational sessions of the meetings. It must become evident by a more active participation in the work of the meetings. It should also be self-evident to all of you that there is no other way by which you can derive the greatest benefit by your attendance here.— ERNEST LAMOUREUX.

NEWARK BRANCH EDUCATIONAL PROGRAM

The Educational Committee of Newark Branch has completed plans for its program for the coming year. One meeting each month shall be given to outstanding speakers and shall be of such calibre as will insure an informative and educational program. This will include an open meeting on October 17 at which time an "Information Please" Program will be conducted with the following acting as experts: Dr. Walter R. Meyer, Mr. Gustave Klinkenstein, and Mr. Adolf Bregmann.

In addition one meeting each month shall be alloted to speakers who are members of Newark Branch. These speakers are not selected. All members are asked to give a paper and the phase of the Educational Program will be conducted as a contest to determine the best paper presented. A point system will be selected, whereby the judges will be able to maintain an accurate check of each paper presented during the year. The judges are Thomas Haddow, Samuel Glickenhaus, and L. J. Donroe.

WILLIAM T. MAGUIRE
President of Newark Branch

All papers must be written and submitted to the Secretary for publication in the MONTHLY REVIEW. Failure to submit a written paper automatically eliminates the speaker as a contestant for the prizes given by the Branch. The prizes shall be as follows: First, equivalent to $10.00—not cash—the winner may select a book on Plating, Chemistry, or allied subjects, the choice of which will be his own or he may select a test set, such as pH, Colorimetric, etc., toward the cost of which the Branch will contribute $10.00; Second, free dues for the coming year in Newark Branch; Third, Subscription to *Metal Finishing* Magazine or its cost equivalent. All contestants will receive a suitable certificate.

No contestant shall speak more than twenty minutes, if two speakers are scheduled, followed by a fifteen minute discussion. If three speakers are scheduled, the time limit is fifteen minutes followed by a ten minute discussion. Speakers are asked to stay within the time limits. The winners will be an-

nounced at the last meeting in May, 1942, and the prizes awarded. The presentation will be made at a Buffet Luncheon with a suitable speaker chosen to make the presentation.

The following men have volunteered as speakers: Robert Sizelove, Royal Clark, Sr., John Kotches, Paul Oldam, Horace Smith, George Wagner, William Bruhns, George Reuter, William Maguire, Adolph Bialecki, William Hodecker, Jr., Urban Mullin, G. Byron Hogaboom, Everett Ward, Nelson Sievering, James Monagle and Harmon Hunt. The first speakers are scheduled for October 3rd.

It is the aim of the Newark Branch to promote further discussions at branch meetings and we sincerely believe that the above program will be of great interest to all its members.

A NEW, NEW ENGLAND NEIGHBOR

The American Buff Company, general offices in Chicago, announces the appointment of Mr. Charles R. Allen as their New England representative. Mr. Allen's address is P.O. Box 65, Wethersfield, Connecticut. During the past fifteen years, Mr. Allen has been serving the buffing and Polishing industries. He is a member of the American Society of Tool Engineers and possesses an unusual knowledge of the entire field of Buffing and Polishing operations. Mr. Allen is particularly experienced in working with ever improving modern methods of Buffing and Polishing. Due to his training, he has been very successful in making complete layouts and installations. Mr. Allen promises to serve New England "100%".

USE OF UNPRINTED CLOTH BAGS SUGGESTED TO AID REUSE

(From *Defense* Sept. 9, 1941)

A suggestion that, wherever possible, printing be eliminated on bags made of burlap and other textiles so that they may be used over again was made September 6 by the Division of Civilian Supply, Office of Production Management. Bags are used extensively for packaging by defense and civilian industry and especially for agricultural products. Shortages have developed that make it necessary to conserve bag supplies to the greatest degree possible.

The presence of printing on bags prevents their reuse in many cases. In instances where such printing is required by law, it is suggested that the requirements be met by the use of appropriate tags.

Consumers are urged to either return bags to the seller of the merchandise or to sell them to recognized second-hand dealers, thus making them available for reuse.

FIRE ENGINES TO SACRIFICE BIG BRASS BELL

(From *Defense*, August, 1941)

The great American fire engine will be a more subdued and modest creation before this defense program goes much further. It will put out fires just as well, but it won't dazzle the eye nearly as much as it has in the past. There's going to be a big change in the matter of using brass, aluminum, copper and similar metals to make the fire engine handsome. A good deal has been done already. Leading manufacturers have conferred with the Office of Production Management frequently during the last few months, and have agreed to reduce their use of critical metals. But big savings remain to be made, and fire engine manufacturers presently will have a further meeting with OPM officials on that subject. One of the prized features which the fire engine will lose will undoubtedly be the big brass bell. Some of these bells contain as much as 45 pounds of brass, which would make a lot of shell cases or other vital defense items.

PROTECTIVE COATINGS FOR ALL MATERIALS

Protective Coatings Incorporated of Detroit has been established to meet one of the more acute problems confronting defense manufacturing. The company features a complete range of products for the protection and preservation of materials used in manufacturing, known as the Tocol line. Their service includes complete rubber insulation as well as more than 35 products for the protection of building structures, metals used in production and for the protection of many types of materials against the ravages of the elements — water, sun, acids, and alkalis — as well as general wear. Aquanil, a non-oxidizing waterproofing material, for concrete, stone, wood, brick and metals is one of the leaders in this line. Others are Deox, a metal conditioner for

TOM COLLORD

all metals; Helfyr, a coating that resists temperatures to 3000°F. and is used principally for refractory linings; and Volcazite which protects metals against all forms of corrosion.

The company is headed by H. Tom Collord who has become well known to American industry during the last decade. Mr. Collord has in the last few years cooperated with a group of industrial laboratories in the development of unique and serviceable protective coatings. Mr. Collord is the founder of the firm, Collord, Inc., producer of rubberized production parts for the automobile industry. He is also founder and president of Paramount Rubber Service, Inc., Detroit, a rubber insulating service organization whose trademark "S R L" on tank linings is well known to the industry in general.

Protective Coatings Incorporated is now in production and is serving a group of industrial concerns who have coating problems. The Tocol line includes a coating to prevent corrosion and to preserve the surface of nearly every known material now being used in manufacture.

For the Plater's part in Defense

It's "All Out For Defense" with a race at top speed of men and machines against minutes. Planes, tanks, ships, submarines and a host of other equipment for the Army, Navy, Marines and Air Corps require plated parts — properly plated to withstand hard use and abuse.

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H-VW-M Generators, Conveyors (Semi and Full Automatic), Treatment Tanks, Rheostats, Rectifiers, Tumbling Barrels, Plating Barrels, Buffing and Polishing Lathes are playing an important part in defense.

H-VW-M Anodizing Equipment is used for aluminum sheets, castings, forgings, extruded shapes for planes, engines and auxiliary equipment such as landing gears, instruments, etc. H-VW-M Plating Equipment and Supplies are preferred for finishing machine gun parts and clips, rifle parts, hard chrome plated tools and dies, engines and accessories, torpedo parts, hardware for combat automobiles, cowlings and manifolds for airplanes, metal buttons for uniforms and many others.

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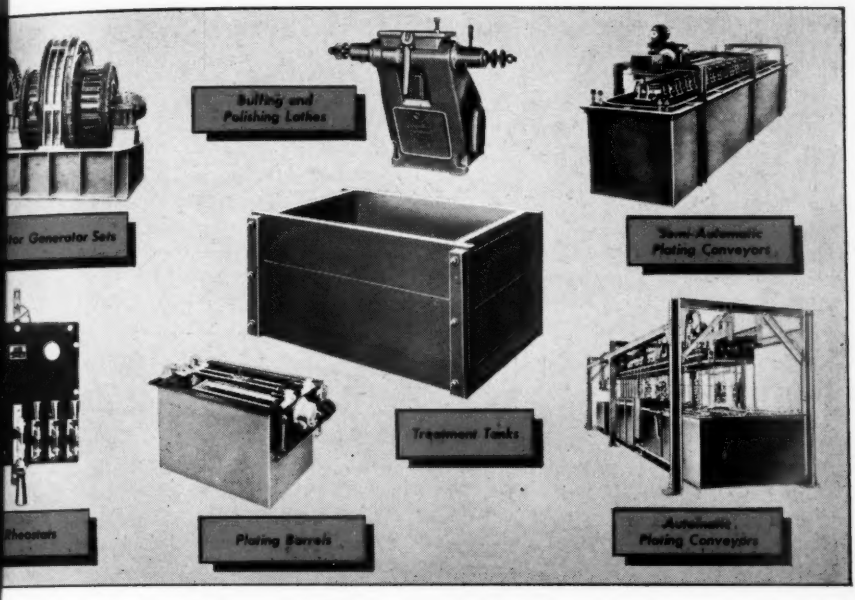

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In addition to enlarging our plants and adding to production equipment, we have increased our Sales, Engineering and Research staff — and even though we may not be able to supply you now, we still value your good will and wish to cooperate to every possible extent in suggesting ways to change, or replace current plating, polishing, cleaning and pickling methods until the present unavoidable conditions return to normal.

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Business and Social News

BRANCH NEWS

Educational Activities

AMERICAN ELECTROPLATERS' SOCIETY

Buffalo Branch held its regular monthly meeting at the Bailey Bowling Academy, Friday, September 12, with President Joe Ruff in the chair. Mr. Ross of duPont gave an interesting account with color slides of his several fishing trips into Northern Canada. This was followed by a highly amusing picture review of our annual picnic presented by Mr. Carlson. Mr. Ross and Mr. Carlson received a hearty vote of thanks. The meeting adjourned at 11.30 followed by the usual refreshments.

RHODERICK MCGHEE, *Secy.*

Newark Branch held its regular meeting on Friday evening, August 15, 1941 at the Hotel Robert Treat, Newark, N. J. The meeting was called to order at 8:30 P.M. with President William T. Maguire presiding. Other officers present were: William Bruhns, Vice-President; Louis Donroe, Librarian; Paul A. Oldam and John B. Kotches, Board of Managers.

The members present agreed to dispense with rules, three to eight.

The final explanation and instructions for our Annual Picnic were given. It was suggested that signs be posted from Morris Ave. and Route 29.

Librarian Louis Donroe reported that the Educational Program for 1941-1942 was in its final stage. From responses of our membership it is estimated that the plan outlined in the program should have a turnout at each meeting that will exceed previous years.

An informal Question Box was conducted on various nickel solutions and the members present benefitted by the round table discussion.

JOHN KOTCHES, *Secy. Protem.*

Pittsburgh Branch held their first meeting of the Fall, Thursday evening, September 4, at the University Club. Mr. B. C. Case of the Hanson-Van Winkle-Munning Company was the guest speaker who talked on "New Copper Plating Solutions." In his talk Mr. Case discussed the history and present operating conditions of the alkaline copper sulphate solution using amines.

In 1937 Mr. Brockman reported his experiments on alkaline copper sulphate solutions using amines to the Electro-Chemical Society. Dr. Weisburg experimented with this type of bath and found that the best results were obtained with the following amines: diethylene, triamine, dipropylene, triamine, hydroxy ethyl ethylene triamine, and triethylene tetramine. In the manufacture of diethylene triamine the other amines are also formed, and their use helps reduce the cost since there is no other demand for these amines. As soon as it was discovered that ammonium sulphate was required to obtain good deposits, the basis of the present solution was developed. While no set formula is stated for the solution, a good average formula is: 16 oz. per gal. copper sulphate, 13 oz. per gal. diethylene triamine, 3 oz. per gal. ammonium sulphate, ½ to 4 oz. per gal. ammonium hydroxide, ¼ oz. per gal. tergitol as a wetting agent. This solution can be operated at 40-50

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amps. per square foot at a temperature of 120-160°F.

Iron and lead impurities cause trouble such as loss of brightness, and for that reason one cannot use lead or steel tanks or heating coils. Zinc on the other hand apparently causes no trouble but plates out as a brass. The solution is operated under license.

FRANK KELLER, *Secy.*

Detroit Branch held its first meeting of the current season at the Statler Hotel, Friday, September 5, with President Pinner presiding. After the business details of the meeting were taken care of, a colored motion picture was shown covering the work being done at the Chevrolet Gear and Axle and Forge Plants, in the manufacture of heavy parts such as crankshafts, axles and large gears.

Mr. J. M. Cosgrove of Bruce Products Co. gave a short talk on Plating Tank Ventilation in which he discussed formulas for determining proper ventilation systems.

Mr. C. F. Nixon of Ternstedt Mfg. Co. talked on meeting present day conditions and exhibited samples of new racks they have developed.

Mr. L. K. Lindahl of Udylite Corp. spoke on the government restrictions limiting the sale of scarce metals and gave his personal experiences and views on the situation. He exhorted all platers to get into defense business as quickly as possible in order to preserve their existence.

The Question Box was conducted by Mr. Hahn who called on Messrs. Cosgrove, Bleil, Nixon and Lindahl to serve on the Board of Experts.

WARREN I. GRIMMER, *Secy.*

Toronto Branch, Sept. 5, King Edward Hotel. President Graham opened the first fall meeting with a fair attendance including four visitors. Three applications for membership were received and the applications of George Trueman, James Norman Leach and Russell N. Eady were balloted and elected into membership. Art Severs was elected second vice-president to look after the membership drive. The members expressed regret at the illness of Jack MacLean. Jack was a trustee and Mr. Boaz was elected as substitute.

Mr. Acheson spoke on joint meetings with Montreal and Buffalo Branches but the shortage of gasoline sort of put a damper on the idea, for Montreal at least, but John has started something and we are sure to make the trip to one of them.

Mr. Bill Price read his report of the convention proceedings that were held at Boston. Bill was on the job at every session and never missed a thing.

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... because their unexcelled purity assures uniform corrosion, the highest quality deposit in the shortest possible time and low scrap losses. Furnished with suspension holes drilled as desired, or tapped for end hooks.

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This report was a good one and worthy of mention. After this the talk was about Grand Rapids. Walter Barrows has something up his sleeve for the next get-together affair, such as History of Toronto Branch from 1912.

President Graham along with Allan Byers promised the next few meetings would be full of interest and asked the members for full attendance and to bring their friends.

JAMES S. CAIRNS

Bridgeport Branch held its regular monthly meeting Thursday, Sept. 4, at 8 P.M. at the Stratfield Hotel with President John E. Charleson presiding. Wm. Ehrencrona, chairman of the outing committee and George Wagstaff gave us a full report on the outing to be held Saturday September 13 in Trumbull, Conn., at the home of Mr. Ehrencrona. The secretary was ordered to give Mr. Ehrencrona $50.00 advance money for immediate expenses.

The regional meeting report was not complete and will be given at a later date. Eugene Phillips, chairman of the sick committee reports all members in good health.

A letter was received from Mr. Maurice R. Caldwell, our third Vice President, asking us to elect a second Vice-President who will also be chairman of our membership committee. Mr. R. J. O'Connor was unanimously elected to the office of Second Vice-President of the Bridgeport Branch. New members were introduced to the members of the Bridgeport Branch.

Balloting for Membership: Prescott C. Albee—Jackson Buff Corp., as associate member.

President John E. Charleson turned the meeting over to our Librarian Mr. C. C. Helmle. There was a good discussion on various plating problems including new ideas and activities done currently in the electroplating industry.

JOSEPH G. STERLING, *Secy.*

Waterbury Branch held its first meeting of the season, Friday, Sept. 12 at the Hotel Elton with fifty-one present. The meeting was called to order by President Ralph Colter who welcomed the speakers, the guests, and members. A brief announcement was made of the impending Candee-Crane stag dinner to be held at the Hotel Elton Oct. 25. Waterbury Branch feels itself honored to have as members the President of the Supreme Society and the President of the International Fellowship Club. The indications are that every member of the Branch who is physically able will be on hand to celebrate with Candee and Crane.

Announcement was made that W. L. Cassell was elected second vice-president in charge of membership at the

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business meeting held September fourth.

At the next meeting the dinners which have been held at 6:30 P.M. in the colonial room will be resumed. Unfortunately, like the cost of everything else the cost of dinners is going up and will be $1.25 per person. We trust this will not deter the crowd which normally gets together at this time.

Applications from Walter R. Ruefli, Emile J. Beloin, Roy A. Anderson, and Jacob Hyner were referred to the Board of Managers and will be acted upon at the next business meeting. At the conclusion of the business, some very fine colored pictures of the Boston Convention were shown. Mr. Hogaboom ably commented on them during the presentation. This meeting was especially dedicated to the Old Timers and Bill Gray as Chairman of the Program welcomed these old timers and introduced the two speakers.

The subjects for the evening were particularly well chosen for our opening meeting, spreading before us the background of the whole plating industry. Mr. Hogaboom, speaking on the "History of Nickel Plating," reviewed the earliest experiments in electroplating carried out in England, France, and Germany as well as the United States. Many of these early experiments were not too successful and it remained for Dr. Isaac Adams to develop and market the first really successful nickel plating process.

Mr. Edward H. Davis speaking on "Personal Reminiscences of Dr. Isaac Adams, Jr." presented from his friendship with this remarkable man an intimate picture of a very human and kindly person, a man of rare ability and insight.

Refreshments were served near the end of the evening and from the many comments, the evening was very successful. The Branch feels deeply grateful to these two gentlemen who so ably presented this historical review.

SPENCER L. HENN, *Secy.*

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Cleveland Branch held its meeting of June 28 at Hotel Cleveland. This meeting was called to order at 8:30 P. M. by President P. R. Lyons. We had an attendance of 15 and the evening was rather warm. The following men approved by the Board of Managers, were elected by acclamation, Wm. V. White of The Parker Appliance Co., Oscar Kuntz of Metal Finishers, Inc., K. H. Piepenberg, Elyria Plating Co., Elyria, Ohio.

Mr. Geo. Scott gave a report on the coming picnic. Mr. Lyons brought up the subject of starting a project to raise money for the treasury. This was left open. We had a report of our delegates who had attended the National Convention at Boston. Mr.

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(And let the rest of the world go by.)"

Matts gave a report on the highlights of the business portion of the convention.

Mr. Thompson gave an interesting report on the educational sessions and this was followed by a very interesting discussion. Mr. Scott gave a report on Plant visitation and the social functions. These were reported as very agreeable.

Forty-four members were present at the September meeting. Under applications for membership the following were submitted, Geo. H. Carter, Oakite Products Co., residence 2000 West 14th St., Cleveland, Ohio, Associate Membership; Henry Bloser, Metal Finishers, Inc., 1710 Corning Ave., Cleveland, Ohio, Active Membership; Charles J. Foley, Accurate Plating Co., 10607 Harvard Ave., Active Membership.

Under reports of committees, the entertainment committee submitted their report on the picnic and in addition to it's being a success socially, they showed a profit. Mr. Singler tried out a new idea and it seemed to be a success.

A letter was received from a brother of our member John H. Vignos of Canton, Ohio, who passed away. Our Librarian was instructed to send a note of sympathy. Mr. Vignos was a member of our Branch since Sept. 7, 1940.

Mr. John Honnecker our librarian then introduced as a speaker one of our own members Howard H. Blouch of the duPont Company who as speaker of the evening gave a very interesting discussion on the plating of stainless steels. Mr. Blouch had a very carefully prepared and planned talk and gave us some very interesting and appropriate pointers on this type of plating. He gave its various applications such as decorative purposes, ease of drawing such as wire manufacture and its use on dies. Some of the coatings discussed were nickel, copper, cadmium and zinc plate. He also brought out the fact that when wire was coated with zinc and then drawn, the plate did not diminish but was spread out evenly.

FRANK J. OPATRNY, *Secy.*

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Newark Branch held its regular meeting on Friday evening Sept. 5 at the Hotel Robert Treat. The meeting was called to order at 8:30 P. M. with President William T. Maguire Presiding.

A communication from our Supreme third vice-president, Mr. Caldwell, with reference to appointing or electing a second vice-president to the Branch, whose chief duty would be chairman of the membership drive, was read and

Mr. Robert R. Sizelove was elected to that office by unanimous vote.

Mr. Robert Klass and Mr. Anthony DiNardo were elected to Associate Membership of Newark Branch. Mr. G. E. McGuire was reinstated to Newark Branch Membership. A request from Mr. Meyer Roter for a transfer to Los Angeles Branch and an answer by the Secretary to this request were read and held over for future action. A request for a transfer for Mr. William F. Newberry from Newark Branch to Detroit Branch was granted.

Mr. Horace Smith spoke on the Picnic and the Christmas Party and asked the members for suggestions to raise funds to defray some of the expenses. Mr. Louis Donroe gave us a brief outline of his scheduled Educational Program for the fall and winter months stating that he had 18 speakers on his list, most of them Newark Branch members. There will be prizes awarded for the three best papers and all papers will become the property of the Society.

Our Executive Secretary, William J. R. Kennedy, was present at this meeting. Mr. Kennedy spoke about his visit to Grand Rapids Branch and their activities on the coming convention.

The September 19 meeting at the Hotel Robert Treat was called to order at 8:45 P.M. with President William T. Maguire presiding. All other officers were present. A communication from President Candee to the members of the Executive Board with reference to a meeting with the OPM was read and the members expressed their desire for the second vice-president to attend if possible.

Mr. Peter Catania and Mr. Raymond A. Ward of Curtiss Wright Corporation Curtiss Propellor Division presented

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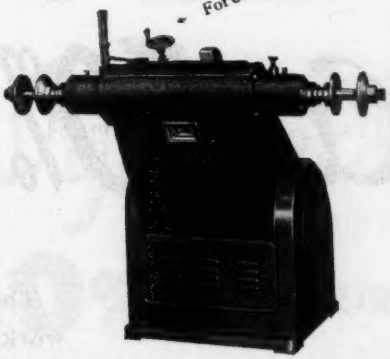

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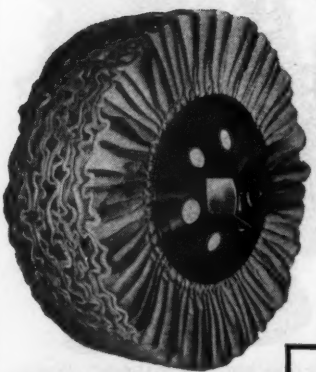

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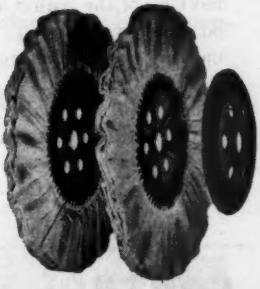

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their applications for Associate Membership.

Mr. Horace Smith reported that our Annual Picnic was a big success. The attendance was 92; it was a beautiful day, plenty to eat and drink, a ball game for the men, and novelty games for the Ladies and children all contributed to make it a merry party.

Mr. Louis Donroe repeated the scheduled Educational Program for the benefit of those members who were not present at the previous meeting. President Maguire spoke on Bill Kennedy's remarks at our previous meeting relative to widening the scope of the Society by admitting Lacquer Finishers, Sprayers, etc. He asked the members to give this matter some serious consideration.

Our Librarian presented Mr. Lee of E. I. duPont de Nemours & Co., who showed us a very interesting sound film in technicolor illustrating the progress made in Chemistry in the past few years. At the conclusion Mr. Lee was given a rising vote of thanks by the 38 members who attended.

GEORGE WAGNER, *Secy.*

Anderson Branch held its opening meeting of the season at the Y.M.C.A. on Tuesday evening, Sept. 9. The meeting was called to order at 7:30 P.M. by President R. W. Oyler.

Mr. W. L. Pinner of Houdaille-Hershey Corporation and president of the Detroit Branch was the speaker for the evening. His subject was "The Effect of Basis Metal Polishing on the Character of Nickel Plate." A discussion followed which centered around the restricted use of nickel as brought on by the defense program. Mr. Pinner later led a discussion on acid copper plating in which he compared its advantages and disadvantages with cyanide copper.

There was a large attendance and by the attention and interest shown by those present the meeting was a success.

E. L. MCKINNEY, *Secy.*

Los Angeles Branch. The September 10 meeting was opened by Librarian E. R. Holman, who acted in the capacity of chairman in the absence of the president and vice-president. A letter from Mr. Maurice R. Caldwell was read requesting that the name of the Vice-President in charge of membership be sent to him. It was ordered that as Mr. Rushton has been acting in that position he shall continue to do so and Mr. Caldwell be so informed.

Mr. James ApRoberts was nominated and unanimously elected second vice-president of Los Angeles Branch. The second vice-president's duty is to be in charge of all exhibits. Mr. Merigold, Los Angeles Branch's delegate to the Convention at Boston made his report to the Branch. He told us that the reactions of the members at the Convention to our invitation to hold a Convention in Los Angeles were very encouraging. Mr. Merigold praised

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Boston Branch highly for the capable and hospitable manner in which they put the Convention over.

Mr. Rynkofs presented the congratulations of the Branch to Mr. Lamoureux on his election to Honorary Membership of the Supreme Society. The members of the Branch are very happy that those efforts and qualities to which the Branch and the Society owe so much have been recognized by the Society. As a token of our gratitude a radio was presented to Mr. Lamoureux. Mr. Lamoureux thanked the Society and the Branch and pledged his efforts to the utmost of his ability, in the future as in the past, for the advancement of the aims of the Society. (Mr. Lamoureux's acknowledgement is among the news items in this issue of the REVIEW—Ed.)

A moving picture which Mr. Holman had obtained from the Visual Education Department of the Los Angeles Board of Education was shown.

ERVIN FRAUENHOFF, *Secy.*

Chicago Branch held its regular monthly meeting September 20 at the Atlantic Hotel, President C. Kelly presiding and all other officers present. The application of Mr. F. C. Berquist was read and a committee was appointed on same.

Mr. R. Hazucha presented the prize exhibit cup won by Chicago branch at the Boston convention, to Chicago Branch. This cup is presented by the *Metal Industry* to the branch having the best exhibit, and will be retained by the branch winning it. Mr. T. A. Trumbour sends his best wishes along with the Cup. Mr. O. E. Servis was reported ill, Chicago branch extend their best wishes for a speedy recovery.

Mr. F. J. Hanlon introduced the Speaker for the evening, the well-known Dr. W. Blum, who spoke on "The Effect of Metal Shortages on the Plating Industry." Dr. Blum gave some very interesting facts and figures on the various metals used in plating and the prompt way he answered the many questions asked him proved that he knew all the answers. There were about 100 present at this meeting.

J W. HANLON, *Secy.*

Indianapolis Branch held its first meeting of the year 1941-1942 at the Hotel Riley. The officers elected for the coming year are as follows: president, Geo. A. Fisher, Jr., Allison Division, G.M.C.; vice-president, Walter R. Binai, P. R. Mallory & Co., secretary-treasurer, Leland E. Bass, P. R. Mallory & Co., librarian, W. W. Cothran, Oakite Products Co., board of managers: David N. Ross, Ross-Ad-Seal Inc., Clark A. Swinehart, Geo. J. Mayer,

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In the absence of Mr. Binai, our past president, Mr. David Ross, our chairman for the evening, relinquished the presidency to Mr. George Fisher our new presiding officer. Mr. Fisher spoke briefly of his intentions for the coming year and then asked our 1941 convention representative, Mr. Leland Bass, to report on the proceedings of the national convention. Mr. Bass summarized the proceedings, stressing mainly the highlights of the convention, both social and educational, and highly commended the Boston Branch on the manner in which they conducted the program for the 1941 delegates.

LELAND E. BASS, *Secy.*

Grand Rapids Branch held its meeting September 11 in the Wolverine Room of the Rowe Hotel. The meeting was called at 8:30 o'clock by our president, and was attended by approximately 65 members. Members were asked for their comments regarding the purchase by this Branch of a sound projector to be used at our educational meetings. The problem was tabled for further consideration as to price, etc.

Report from the delegates who were at the National Convention in Boston was given. Mr. Chester Smith gave us a resume of all happenings and doings which transpired at the Convention in Boston, and he also gave us a review of the committees who are connected with the promotion of work of the convention to be held here next June, introducing all of the several committee chairmen. A motion was made and carried that a loan be made from the General Fund of $300.00 to help finance immediate expenses in connection with the 1942 Convention here next year.

Committees are now at work on the annual banquet to be held sometime in January. A motion was made and carried that this Branch change its meeting dates from the second Thursday of each month to the second Friday of each month, meeting at the same time, at 7:30 at the Rowe Hotel. Four applications were presented for election.

The meeting was then turned over to our speaker, Mr. P. C. Case, who talked on the Weisberg Copper Plating Solution. After Mr. Case gave his

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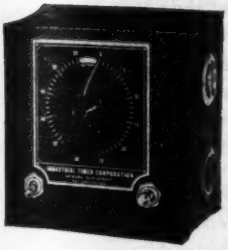

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paper, questions were asked and a discussion took place. We were then entertained by sound motion pictures entitled "Arizona — Mineral Resources and Scenic Wonders." After the pictures were shown we had our usual Question Box. This was taken care of very ably by Librarian Sperry.

C. E. ABEL, *Secy.*

Providence-Attleboro Meeting, Monday, September 15. A well attended meeting was held in the Providence-Biltmore Hotel. A total attendance of 34, about half of which comprised visitors, heard a good talk by Mr. Geo. B. Hogaboom, of Hanson-Van Winkle-Munning Co., on the topic of "Plating Room Economy."

Mr. Hogaboom first reminded us of some of the experiences of the previous World War period. He pointed out that we now could expect reductions and revisions of specifications in plated deposits. Under economies he recommended more attention to reduced current consumption, closer accuracy in meeting thickness requirements, more protection of racks and related steps.

He noted that many times it was decidedly feasible to watch drag-out factors, especially in the plating of the more complicated pieces. And he spoke of two or three instances where recovery from after-rinses made surprising savings. There have also been many cases where wires and racks, when treated for the purpose, have returned good anode metal to the plater or plating department.

What appeared to bring out the most discussion was mention of new possibilities in plating solutions. General characteristics of copper chloride solution, silver nitrate solution and a recently perfected method of plating a tin-copper deposit.

We were fortunate, also, to have with us Dr. A. K. Graham who spoke briefly to us on the general aspects of the place of electroplating in today's economic picture. Dr. Graham will quite likely be the speaker at our October meeting and we can expect, whatever his topic, that we will be well repaid by attending.

At a brief business meeting Mr. George A. Desmoreau, South Worcester St., Chartley, Mass. was elected second vice-president. His duties are to handle membership activities.

Four new members were accepted.

F. E. ALLEN, *Secy.*

? QUESTION BOX ?

Toronto Branch

1. *Is barrel plating being done with silver sol.?*

Ans. Yes, it is, with fairly good results but not common practice.

2. *What should acid ratio be for hard chrome sol.?*

Ans. From 80 to 100 to 1.

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PLATING AND RUSTPROOFING ASSOCIATION PARTY

The 1941 Annual Summer Stag Party of the Plating and Rustproofing Association of Michigan was held at Gowanie Golf Club at Mt. Clemens, Michigan, on Saturday, September 13. It was well attended by the industry as a whole and many non-member companies were represented as well as a large portion of the suppliers of the local industry.

About forty played golf during the afternoon and approximately eighty sat down to dinner at seven o'clock. Many fine prizes were awarded, both for golf and to those who were lucky and a lavish entertainment was provided for the members and guests.

Movies were taken and will be shown at the regular October Dinner Meeting which, it is expected, will be a rather large party in itself because all those participating in the Outing will be invited. It is hoped in this way that friendly relationships in the industry will thus be further cemented.

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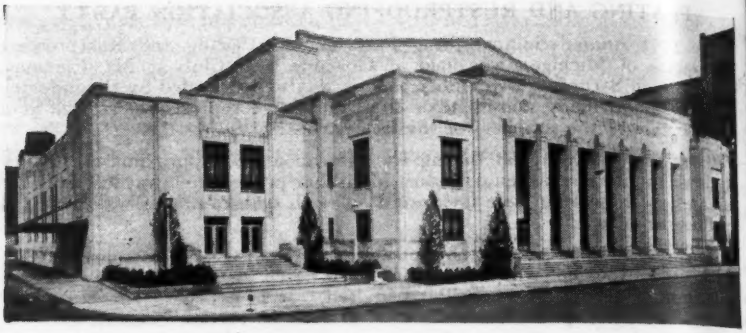

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THE TESTIMONIAL DINNER FOR E. T. CANDEE AND DICK CRANE

Word has come to us that the dinner party for the above two estimable gentlemen will be well worth attending. Wesley Cassell has a program of singing and dancing stars that will make the platers forget their troubles. Ralph Coulter has selected Joe Downes as Master of Ceremonies, but Joe has someone else in mind — a surprise.

Spencer Henn, Waterbury's very efficient secretary, has charge of the sale of tickets. He may be reached at Apothecaries Hall. Mr. Henn desires to have the sale of tickets completed by October 18 so that the hotel management may know how many to provide for. It will be an evening of fun and frolic. Stag of course. Excellent talent.

The place — The Elton Hotel, Waterbury.
The date — Saturday, October 25th.
Time — 7:30 P.M.
Tickets — $3.00.

The Reason — To honor two outstanding members of the A.E.S., Ellsworth Candee, President of the National Society, and Dick Crane, Chairman of the International Fellowship Club, both members of Waterbury Branch. Friends are expected from many Branches throughout the country. We'll be seeing you.

ORGANIZATION MEETING AT SYRACUSE

A meeting of the Syracuse members was held on Friday Evening, September 19 at the Onondaga Hotel for the purpose of starting a branch of the A.E.S. in that city. A supper preceded the meeting. There were 22 present including members of Rochester, Binghamton, and Anderson Branches. The Executive Secretary was introduced by George Simmons of Herkimer, formerly President and Secretary of Binghamton Branch. After explaining the objects of the Society, requirements for membership and the benefits received from active participation in the affairs of the organization, the meeting was given over to a question and answer period.

This being concluded to everyone's satisfaction, the following officers were elected: president, Dwight Overcash, Foreman, Brown Lipe Chapin Co., Syracuse, member of Anderson Branch; vice-president, Russell Warner, Manager Easy Washing Machine Co., Syracuse, member of Rochester Branch; secretary-treasurer, George Simmons, Herkimer, N. Y., Foreman, Quackenbust Co., Herkimer, member of Binghamton Branch; librarian, Angelo Giorgi, Brown Lipe Chapin Co., Chemist. Meetings will be held the second Friday of each month at a place to be named. The new officers were installed after they were given the necessary instructions and had pledged their willingness to uphold the Constitution and By-Laws of the Society.

Professor N. F. Murphy of Syracuse University, Department of Chemical Engineering, was present and talked briefly on a National Defense Training course sponsored by the U. S. office of Education. Dr. Murphy's remarks were so well received that he was asked to visit the meetings often. He liked the boys so well that he filled out an application for associate membership.

Mr. Overcash, in accepting the office of president, spoke briefly of his desire for full cooperation by the members. He said he expected a full attendance at each meeting, and promised to do all in his power to make Syracuse Branch a success. Messrs. Warner, Simmons, and Giorgi made similar remarks after which each one was loudly applauded. Representatives from companies in addition to those mentioned were O. M. Edwards, Smith Typewriter, General Super Plating, Oakite Co., F. B. Stevens, Lampson Co., etc.

Several plants were visited previous to the meeting. All were very much interested in the new branch and promised their support. We were particu-

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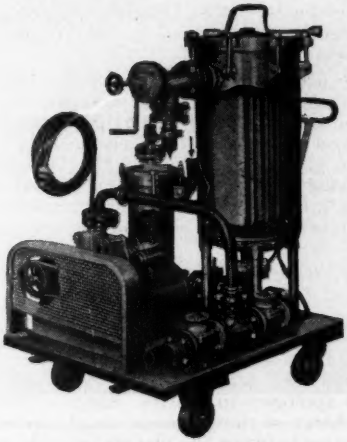

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larly interested in a visit to the Crouse-Hinds plant, where metal finishing of all kinds, particularly zinc plating and aluminum finishing are done in tremendous quantities. Mr. H. Taylor is in charge of the plating and production here and spent several hours showing us the different finishes produced. Large plant expansion in foundry and plating departments are in progress. We appreciate the privilege of visiting the plant and the time given by Mr. Taylor, who also promised to support the new Branch.

There was a well attended meeting of Newark Branch on Friday Evening September 5. One of the most interesting reports listened to for a long time was given by Louis Donroe, Librarian of Newark Branch. Inasmuch as the details are included in Mr. Wagner's report of the meeting, we will not duplicate it here.

We are particularly hopeful that the program will be entirely successful and that it will give other branches the enthusiasm needed to adopt similar methods. It will also provide articles for publication in the REVIEW by foremen platers and others, the need for which has been apparent for some time. All in all, we congratulate Mr. Donroe and his committee for their efforts in giving something of real value that will not only benefit the members of Newark Branch, but will create considerable interest in the A.E.S. in general. If further comment is necessary, we can only refer to the slogan "Newark knows how."

On Saturday morning, September 6, we journeyed to Vogel's Grove in the town of Union with Mr. and Mrs. Horace Smith, to enjoy the annual outing of Newark Branch. The day was ideal, the attendance large, and the eats all that one could desire, likewise the drinks. The ladies as usual turned out in full force and helped considerably in preparing the hamburgs, frankfurters, sausage, corn and the other good things that only women know how to cook, (with apologies to Messrs. Kotches, Smith, Wagner, Taylor). Paul Oldam had charge of the games as usual, one of the most interesting of these was a ball game between the platers and salesmen. Horse shoe pitching and quoits were also popular pastimes. The members of the Executive Board, Messrs. Candee, Wagner, and Fulforth had a meeting as originally arranged. Routine business was discussed regarding the Society's welfare.

The outing was honored with the presence of Fred and Mrs. Gumm and party . . . George Reuter was official bar tender as usual . . . The two most handsome men in Newark Branch are not so handsome now — Horace Smith and Paul Oldam lost some of their teeth, in the dentist's office of course — they're both good friends. Many familiar faces were missing; the reason, too many people working overtime.

Vogel's Grove is a dandy spot for an outing. Everything to do with, even an icebox. There is also a golf course on the other side of the fence. About 5 P. M. President Candee and the writer started for home, through one of the most beautiful sections of the country, New York, New Jersey, Connecticut and of course, Massachusetts. Thank you, boys and girls of Newark Branch. You provided us with plenty to eat, good fellowship and a desire to come back again sometime, maybe Christmas.

THE RESEARCH COMMITTEE MEETING IN WASHINGTON

On another page an account of the above meeting is given in detail. Previous to the meeting on Sept. 11, Dr. Blum and the Executive Secretary discussed the possibility of having the A.E.S. represented in Washington as some other Societies are. While still considering the matter, Mr. Kemp, of OPM called on Dr. Blum regarding other matters. We talked with Mr. Kemp informally as to the advisability of having our Society represented by a committee so that we could furnish the OPM with information regarding the needs of our members and thus keep the Government informed on many things regarding the plating industry's value in National Defense. We met in Mr. Kemp's office at the S. S. Bldg. after lunch at which time it was suggested

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that Mr. Kemp be given the names of a number of men and firms, representing the Platers Society, the Supply house men, and the manufacturers.

Dr. Blum was authorized to present such a list by the Executive Board to the OPM with the suggestion that a meeting be called about the middle of October in Washington, at which time further action will be taken. It was felt by all the members of the Research Committee that the forming of this committee would be a step in the right direction in order that our interests may be more fully looked after at the Nation's Capitol, and also to assure the government officials that we desire to cooperate with them in every possible way. The members of the A.E.S. will be fully informed of developments in this connection through the pages of the REVIEW.

COPIES OF SPECIFICATIONS

Quite recently we mailed to each branch a few copies of Specifications for electrodeposited coatings of Zinc, Cadmium, Nickel, and Chrome on Steel, Coatings of Nickel and Chromium on copper and zinc base die castings, and Methods of Test for Local Thickness of Electrodeposited Coatings. These copies are for distribution to members who really need them. To save expense, only 500 copies were purchased. These may be secured by asking your branch Secretary for them. There is no charge.

OSCAR SERVIS IS ILL

Mr. Frank Hanlon informs us that Oscar E. Servis, former president of the A.E.S., is seriously ill at St. Elizabeth's Hospital in Chicago. Mr. Servis has been operated on, but at this writing the result is not known. We all hope that Oscar will recover completely and that he will soon be able to greet his friends with his usual cheery smile.

COPIES OF THE PROCEEDINGS

Copies of the 1941 Proceedings will be ready for distribution at many of the Branch meetings this month. These were delayed somewhat because of failure of some authors to return proofs promptly to the printers. We wish to remind you that only members in good standing and whose elections took place previous to the end of the fiscal year, April 30, 1941, are eligible to receive these copies. We are sending a few extra to each branch but we are unable to accommodate all who desire copies, much as we would like to.

EVENING COURSE IN PRACTICAL CHEMISTRY

The Department of Chemical Engineering, College of Applied Science, Syracuse University, Syracuse, N. Y., is planning to offer a course in Practical Electrochemistry as one of a series in Engineering, Science, and Management Defense Training. The course will begin October 1, 1941, and continue until February 1, 1942. The course will be open to high school graduates with some training in chemistry. There will be no tuition expense to the students or their industries. No textbook will be required, but supplementary reading will be suggested.

The course is designed to make the student acquainted with the fundamentals of electrochemistry and electroplating. Electrochemical measurements, electroplating tests and technique, plating bath analysis will be stressed with the purpose of preparing the students for more advanced work in the subject. The students will study the design of plating equipment and accessories. Actual experiments will be carried out in the laboratory. The students must register at the office of Dean Louis Mitchell, College of Applied Science, Syracuse University, Syracuse, N. Y.

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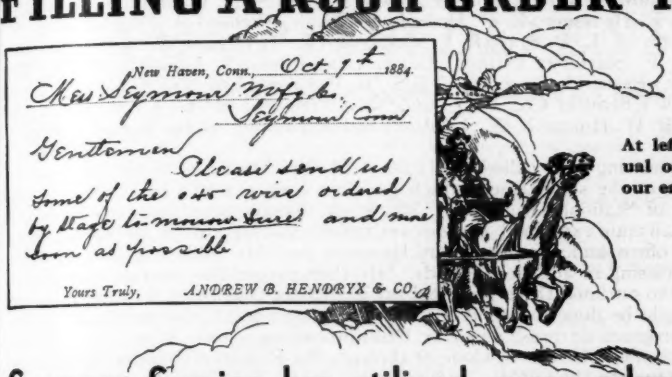
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WE still use every advanced method of shipment, but how the picture has changed! Not in all our 60 odd years have we faced such a national emergency as this! Compared with the super-heated activity at the Seymour plant, life in even the middle 30's was a mere jog trot. Equipment and staff throughout have been unbelievably augmented, and still it looks like "only the beginning"!

Nevertheless, Defense orders are being filled according to a careful scheduling which, we believe, gives all a fair break.

THE SEYMOUR MFG. Co., Seymour, Conn.

SEYMOUR

NICKEL SILVER - PHOSPHOR BRONZE - ANODES

RESEARCH COMMITTEE MEETING AT WASHINGTON, D. C. SEPT. 12

The following were present — *Members*: Irwin Sohn, W. Blum, E. A. Anderson, C. E. Heussner, R. O. Hull, F. C. Mesle, Richard A. Dimon (for E. S. Taylerson), J. L. Downes, F. J. MacStoker, E. T. Candee, W. J. R. Kennedy, and T. F. Slattery; *Visitors*: G. A. Lux, Research Associate, A.E.S., M. Berdick, Research Associate, A.E.S., R. P. Crane, Lea Mfg. Co., R. Seaman, Harshaw Chemical Co., W. Fraine, Past President of the A.E.S., and V. A. Lamb, R. W. Holcomb, W. A. Olson, and A. Brenner, of the Bureau of Standards.

The meeting was called at 11:00 A.M. by Chairman Sohn after an inspection of the steel panels which had just been exposed on the roof of the Bureau of Standards building. Mr. R. A. Dimon acted as secretary. The new chairman explained the circumstances leading up to his appointment to this office and appointed Mr. Heussner and Mr. Wilson a subcommittee on the raising of additional funds. He then turned the meeting over to Dr. Blum who outlined three principal subjects to be taken up: (1) what has been and should be done to round out the steel program, (2) discussion of the proposed program on brass and zinc base die castings, and (3) ways and means by which the A.E.S. as a whole or through the Research Committee might be of assistance to the OPM.

Steel Program

Dr. Blum stated that sets S2 and S2A in Table 1 of the outline of Aug. 25, 1941, were not exposed as they were slightly pitted and seemed inferior to those plated later. These are being plated now from additional steel on hand. S35 and S36 were omitted from the table by error, and should be inserted after S34 as follows:

S35	150, 180, 120	4 — N	S+75
S36	150, 180, 120	4 — N	B 75

S47 and S48 have not been plated and are to show whether the cleaner furnished by Harshaw or the reverse current is the determining factor in the improved adherence. Mr. Seaman stated that Harshaw would furnish the composition of their cleaner.

There was a good deal of discussion as to the additional sets to be exposed with finer finishes than those produced so far. Mr. Crane discussed the "greaseless" compounds manufactured by his company and it was agreed that either these greaseless or the common grease compounds would be more representative of commercial finishes than a 400 or 500 grain dry. Dr. Blum read a letter from Dr. Baker which showed that he also held this view.

Mr. Heussner's motion, that sets S31 and S32 or S41 and S42 be duplicated using grease or "greaseless" finishes, the details to be worked out by Mr. Lux and Dr. Blum, was passed unanimously. The fine grains furnished by the Exelon Co. will be returned to them as their laboratory standards were destroyed by fire and they would like to have these back.

Zinc Base Die Castings

After some discussion it was decided to change the thicknesses in Table IV to: 25 Cu, 50 Zn and 40 Cu, 60 Zn. It was decided not to buff the copper if a reasonably good finish could be obtained.

Mr. Heussner thought it might be better not to use the automatic machine on the zinc base die castings although it was felt that a commercial buffer should do the work if it is done by hand. It was decided to so some initial experimental work at Devine and then have Lux visit some plants doing hand polishing if this preliminary work was not successful.

Brass

It was decided to change the Ni thickness in both Table 2 and Table 3 from 10 Ni to 20 Ni. It was also decided to consider the use of hand buffing and in this connection the same procedure will be followed up as suggested for the zinc base die castings.

At the afternoon session the question of cooperation with the OPM was

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3. Power washer cleaning of *airplane motors* prior to and after assembling.
4. Tank cleaning of *brass shell cases* during the numerous operations of *drawing, tapering* and *annealing*.
5. Power washer cleaning of *machine gun parts* prior to finishing.
6. Power washer cleaning of *steel shells*.
7. Power washer cleaning of *screw-machine aluminum* and *brass munition parts*.
8. Power washer cleaning of *manganese steel helmets* prior to painting.

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brought up by Dr. Blum who described some of the contacts with different members of that office. The OPM would welcome a conference of interested parties in the electroplating field and various government departments and have asked Dr. Blum to provide them with a list of firms or agencies to be invited to such a conference. Dr. Blum thought that such a list should come from the A.E.S. and that the Research Committee could act for them.

A list was therefore prepared which would be acted upon by the Executive Board of the A.E.S. Mr. Heussner moved that in case of an emergency arising, the Chairman of the Research Committee and Dr. Blum be authorized to direct the activities of the Research Associate to whatever work is deemed necessary at that particular time. This passed unanimously.

R. A. DIMON, *Acting Secretary.*

THOMAS A. TRUMBOUR

Along with his many friends who wish him long life and success we congratulate Thomas A. Trumbour, business manager of *Metal Finishing* who recently celebrated his 40th year with the business. Tom has been secretary of the International Fellowship Club since 1929 and has attended all the conventions of the A.E.S.

PROGRAM TO SAVE BRASS INITIATED AT PENCIL MEETING

(From *Defense* Sept. 16, 1941)

A simplification and conservation program designed to bring about an initial saving of approximately 350,000 pounds of brass a year was initiated on a voluntary basis September 10 at a meeting of the advisory committee of the wood case lead pencil industry with representatives of the Division of Civilian Supply. Brass, one of the metals most vitally needed in the national defense program, is used in the manufacture of tips and clips for lead pencils. The advisory committee set up tentative subcommittees on simplification and conservation, manufacturing and public relations.

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H. D. McLeese
Dr. J. E. Stareck
United Chromium, Inc.,
51 E. 42nd St.,
New York, City N. Y.
Subject: Unichrome Copper, Electrocolor, Patternplate
Available anywhere east of Mississippi River.

Mr. Eastman: F. B. Stevens Co.
Detroit, Mich.
Subject: Buffing Compositions

Frank Watt:
Subject: Automatic Plating
This Company also has a very interesting 16 mm. moving picture taken at the Dayton and Boston Conventions, available with or without the speaker.

M. L W. Burton: General Electric Co.
Bridgeport, Conn.
Subject: Copper oxide Rectifiers for Electroplating.

D. E. Jack: The Duriron Co.
Dayton, Ohio
Subject: Duriron in the Plating Industry.

Dr. M. M. Beckwith: J. B. Ford Sales Co.,
Wyandotte, Michigan
Will be available especially during the month of January. Subject to be arranged.

Mr. Charles Lankau: Egyptian Lacquer Mfg. Co.,
Jacobus Ave.,
Kearney, N. J.
Subject: Metal Lacquers.

W. B. Stoddard: 3720 Benninghofen Ave.,
Hamilton, Ohio.
Subjects: Weisberg-Stoddard Bright Nickel Solution, Effects of Impurities in Nickel and Copper Solutions, and other subjects. Spent five years in Soviet Russia. Available within 100 miles of Hamilton, O., except by special arrangement.

CHARLES C. CONLEY,
1st Vice-Pres. in charge of Educational Activities

PLASTICS PLANT'S EXPANSION IS REFUSED TEMPORARILY TO SAVE MATERIALS FOR DEFENSE

The Supply Priorities and Allocations Board indicated September 10 that expansion of productive capacity to meet purely civilian demand cannot be undertaken at this time if the expansion would require the use of large quantities of material critically needed for defense. This policy was established by SPAB in the temporary denial of proposal to expand the plant of the Tennessee Eastman Corporation at Kingsport, Tenn., manufacturer of plastics.

Although construction of this plant would have provided plastics said to be capable of replacing 8,000,000 pounds of aluminum, 18,000,000 pounds of chrome nickel-plated steel, and 6,000,000 pounds of stainless steel, and 34,000,000 pounds of zinc, the Board held that its immediate construction was not advisable for these reasons — 1. Building of the plant would have required the use of large amounts of various critical materials, including stainless steel, which is inadvisable in view of "an expected early winter increase in the demand for nickel for armor plate and ordnance items." 2. Hundreds of similar applications are on hand, and no single one can properly be granted until it is known how much of a drain on scarce materials would be involved in granting all of them.

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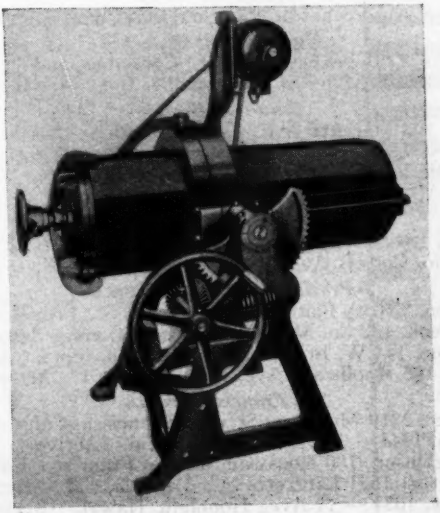

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Membership Report

MAURICE R. CALDWELL, *Chairman, Membership Committee*

To October 1, 1941

ELECTIONS

Bridgeport Branch

Prescott C. Albee, 107 Clinton Ave., Mineola, L. I., N. Y. Associate

Cleveland Branch

Wm. V. White, 13617 Kelso Ave., Cleveland, Ohio. Active
K. H. Piepenberg, 1416 Olivewood Ave., Lakewood, Ohio. Associate
Oscar W. Kuntz, 4836 East 85th St., Cleveland, Ohio. Active

Hartford Branch

Antonio Dascoli, 297 N. Main St., Southington, Conn. Active

Indianapolis Branch

Thomas O. Evans, 1723 Pennsylvania St., Columbus, Ind. Active
Ezra A. Blount, 301 S. Miller St., Shelbyville, Ind. Active

Lancaster Branch

W. H. Fordney, 603 Marietta Ave., Lancaster, Pa. Associate
Raymond Nissley, 717 Rockland St., Lancaster, Pa. Associate
John C. Mylin, Willow St., R.F.D. #1, Lancaster, Pa.
Harry Britcher, Mt. Wolf, Pa., R. F. D. #1. Active

Newark Branch

Robert L. Klaas, 101 Overlook Road Upper Montclair, N. J. Associate
Anthony DiNardo, Correja Ave. & Iselin Blvd., Iselin, N. J. Associate

Providence-Attleboro Branch

George A. Johnson, % City Plating Co., 36 Garnet St., Providence, R. I. Active
Edmond H. Moreau, 132 So. Main St., Moosup, Conn. Associate
Eric G. Shearstone, 144 W. Britannia St., Taunton, Mass. Associate
Frank K. Smith, 105 Knollwood Ave., Cranston, R. I. Active

San Francisco Branch

Harvey De Remer, 2219 Monterey St., San Francisco, Cal. Active
Harold Hardwich, 1244 — 72 Ave., Oakland, Cal. Active
Edward M. Hodgkinson, 180 Rousseau St., San Francisco, Cal. Active
Fred W. Huntington, 1621 Lafayette St., Alameda, Cal., Active
Joy R. Longfellow, 1034 — 11 Ave., Honolulu, Hawaii. Active
Tony Pograje, 770 Oak St., San Francisco, Cal. Associate
Louis R. Pontes, 5402 Roberts Ave., Oakland, Cal. Active
Marcel L. Schneider, 108 Cortland St., San Francisco, Cal. Associate
Joseph M. Walsh, 1350 San Bruno Ave., San Francisco, Cal. Associate
Willard Weston, 1026 West Place, Albany, Cal. Associate

Toronto Branch

G. E. Trueman, 1177 Lakeshore Rd., Long Branch, Ont. Associate
R. N. Eady, Box 10, Renfrew, Ont., Can. Active
J. N. Leach, Apt. #1, 91 Wellesley St., Toronto, Ont., Can. Associate

APPLICATIONS

Chicago Branch

F. G. Berquist, 154 W. North Ave., Chicago, Ill. Associate

Cleveland Branch

Charles J. Foley, 10607 Harvard Ave., Cleveland, Ohio. Active
George H. Carter, 2000 West 14th Street, Cleveland, Ohio. Associate
Henry Bloser, 1710 Corning Ave., Cleveland, Ohio. Associate

MEMBERSHIP CAMPAIGN REPORT

BRANCH	May 1, 1941	Change in Membership	Percent Change
San Francisco	38	+8	+21.1
Balt.-Washington	43	+5½	+12.8
Hartford	48	+6	+12.5
Montreal	29	+3	+10.3
Bridgeport	72	+6½	+ 9.0
Pittsburgh	43	+3	+ 7.0
Boston	102	+7	+ 6.9
Prov.-Attleboro	44	+3	+ 6.8
Toledo	44	+3	+ 6.8
Toronto	66	+4	+ 6.1
Los Angeles	121	+7	+ 5.8
New York	121	+6½	+ 5.4
Newark	136	+6½	+ 4.8
Bing.-Syracuse	22	+1	+ 4.5
Buffalo	49	+2	+ 4.1
Rochester	76	+2½	+ 3.3
Indianapolis	39	+1	+ 2.6
Chicago	234	+4	+ 1.7
Detroit	260	+4	+ 1.5
Dayton	79	+1	+ 1.3
Philadelphia	150	+1	+ .7
Cleveland	80	0	0
Grand Rapids	77	0	0
Milwaukee	92	0	0
St. Louis	79	0	0
New Haven	100	— ½	— .5
Waterbury	87	— ½	— .6
Anderson	40	— ½	— 1.3
Cincinnati	53	—1½	— 2.8
Lancaster	44	—4	— 9.1
Springfield	69	—7	—10.1

NOTE: Honorary members are included with each Branch.

MEMBERSHIP — May 1st, 1941 = 2537
MEMBERSHIP — Oct. 1st, 1941 = 2609
GAIN IN MEMBERSIP 72
GAIN = 2.8%

Detroit Branch

John F. Oleksik, 5546 McDougall, Detroit, Mich. Active
Elmore R. Fahy, 2751 E. Jefferson, Detroit, Mich. Associate
Glen A. Carlson, 18615 Birchcrest, Detroit, Mich. Associate

Hartford Branch

George Meadows, 106 Bond Street, Hartford, Conn. Associate
Stanley Rutkowski, 24 Lewis Street, Torrington, Conn. Associate

Lancaster Branch

Oscar E. Border, International Chain & Mfg. Co., York, Pa. Active
Theodore D. Gaul, 1833 Cotton Street, Reading, Pa. Active
Frank Weaser, 539 S. 18th Street, Reading, Pa. Active

Newark Branch

Raymond A. Ward, Curtiss Wright Corp., Caldwell, N. J. Associate
Peter Catania, Curtiss Wright Corp., Caldwell, N. J. Associate

New York Branch

Richard H. Knopf, Metaplast Corp., New York, N. Y. Active
Francis T. Kelly, Brewster Aeronatuical Corp., Long Island City, N. Y. Active
Philip F. Weber, Kollsman Instrument Div., Square D Company, Elmhurst, N. Y. Active
Bernard Cohen, Continental Silver Co., Brooklyn, N. Y. Active
William Holland, J. Holland & Sons, Inc., Brooklyn, N. Y. Associate

Pittsburgh Branch

Helmer Bengston, 409 Keystone Drive, New Kensington, Pa. Associate
Byron Victor McBride, Tenth St., Irwin, Pa. Associate

Toronto Branch

R. J. Atkinson, 196 Dufferin St., E., Weston, Ont., Can. Associate
C. J. McKee, 50 Robinson St., Winnipeg, Can. Associate
C. J. Emberley, 139 Monarch Pk. Ave., Toronto, Ont., Can. Active
G. G. Harris, 621 Beresford Ave., Toronto, Ont., Can. Associate

Waterbury Branch

Roy A. Anderson, 1 Central Ave., Waterbury, Conn. Associate
Emile J. Beloin, 32 George St., Bristol, Conn. Associate
Jacob Hyner, 61 Elmwood Ave., Waterbury, Conn. Associate
Walter R. Ruefli, Winsted Rd., Torrington, Conn. Associate

REINSTATEMENTS

Edward J. Finnie, 924 Hilldale Ave., Royal Oak, Mich., Detroit Branch
G. E. McGuire, Newark Branch

TRANSFERS

Carroll Matthews, Associate, from Anderson to Indianapolis Branch
Milton Nadel, Active, from New York to Balt.-Wash. Branch
William F. Newberry, from Newark to Detroit Branch

RESIGNATIONS

H. J. Jacobi, Chicago Branch
Gerald Rosing, Cleveland Branch
George P. Needham, Cleveland Branch
Joseph Kirchner, Lancaster Branch
Thomas L. Stephenson, Springfield Branch
H. Corwin Miller, Springfield Branch

DEATHS

John A. Vignos, 516 McGregor Ave., Ohio. Cleveland Branch
Elriy A. Pearsall, R.C.A., Indianapolis Div., Indianapolis Branch